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BIRAGHI (A.). **Alcune gravi lesioni prodotte da gas tossici su rami di Nocciolo.** [Serious lesions produced by toxic gases on Walnut branches.]—*Boll. Staz. Pat. veg. Roma*, N.S., xviii, 4, pp. 497–508, 1 pl., 5 figs., 1938 (issued April, 1939).

A detailed description is given of injuries observed on the branches of walnut trees growing in the vicinity of a chemical works [cf. *R.A.M.*, xviii, p. 466] engaged in the manufacture of nitrobenzene. These injuries, which, in the absence of any other ascertainable cause, are attributed to repeated exposure to fumes containing sulphur dioxide and nitrous gases, occurred chiefly as extensive areas in which the periderm had become detached from and raised above the underlying tissue and had produced scaling. In other cases, especially in the branches of the current year, the lesions resembled cankers, the bared tissue being black, or in worse cases, violaceous-red and cracked. The gases appeared t ave inhibited the suberization of part of the protective barriers formed between the outer necrosed tissues and the living part beneath.

WILDE (S. A.) & WHITE (D. P.). **Damping-off as a factor in the natural distribution of Pine species.**—*Phytopathology*, xxix, 4, pp. 367–369, 1 fig., 1939.

Experimental evidence is briefly adduced as indicating a correlation between soil constitution and the incidence of damping-off [*Pythium de Baryanum*, *Corticium solani* and other fungi: *R.A.M.*, xviii, p. 358] of red, white, and Austrian pines (*Pinus resinosa*, *P. strobus*, and *P. nigra* [var. *austriaca*]) in the Wisconsin Arboretum, near Madison. On eroded patches of sandy soil none of the species sustained losses exceeding 8 per cent., whereas on heavy mull the susceptible *P. resinosa* suffered 96 per cent. destruction, *P. strobus* being much less affected and *P. nigra* var. *austriaca* remaining immune. It is open to question, in the light of these results, whether further extensive plantings of susceptible northern conifers should be laid down on heavy soils of calcareous origin.

GARREN (K. H.). **Studies on Polyporus abietinus. III. The influence of certain factors on the rate of decay of Loblolly Pine sapwood.**—*J. For.*, xxxvii, 4, pp. 319–323, 1 graph, 1939.

Statistical analyses of the results of decay in loblolly pine (*Pinus*

taeda) sapwood by *Polystictus abietinus* at Duke University [North Carolina: *R.A.M.*, xviii, p. 284] revealed a definite correlation between the rate of rotting and (a) the specific gravity and (b) the moisture content of the wood. The latter factor has been generally accepted as a predisposing influence, but the connexion between specific gravity and decay is a highly controversial question. The writer's data showed that resistance to *P. abietinus* increases with a rising specific gravity, the average loss in dry weight over a four-month period among blocks of uniform moisture content being 0·3504 per cent. less for each additional unit of specific gravity. Similarly, the average loss in dry weight among blocks of uniform specific gravity is 0·1072 per cent. less for each additional unit of moisture. The regression coefficients for a seven-month period are likewise negative, whereas after ten months they are positive, due probably to the progress of the decay to a point at which all the spring wood has been destroyed and the fungus is beginning to attack the summer wood: at this stage an increase in specific gravity would obviously provide more material for infection.

Spread of White Pine blister rust in 1938.—*Plant Dis. Reptr*, xxiii, 4, pp. 58–63, 1 map, 1939. [Mimeographed.]

During 1938 blister rust [*Cronartium ribicola*: *R.A.M.*, xviii, p. 359] was found for the first time on either white pine [*Pinus strobus* and *P. monticola*] or *Ribes* spp. in six counties in the southern Appalachian States, 60 in the north-central, and two each in Montana and California. The present distribution is clearly indicated on the accompanying map.

Škorić (V.). **Da li je Pholiota adiposa Fr. ili Pholiota aurivella (Batsch) Fr. uzročnik karakteristične truleži Jelova drva.** [Is *Pholiota adiposa* Fr. or *Pholiota aurivella* (Batsch) Fr. the causal agent of the characteristic rot of Fir wood?]—*Ann. Exp. for., Zagreb, 1938*, 6, pp. 61–65, 2 pl., 1938. [Received June, 1939.]

The rot of firs [*Abies*], usually attributed in Yugoslavia to *Pholiota adiposa* [*R.A.M.*, xvi, p. 716] has been found by comparative studies of isolations from rotted wood and from spores to be really due to *P. aurivella* [ibid., xiii, p. 532]. The rot is fairly widespread throughout the country, and the fungus also occurs on beech and ash.

Wolf (C. B.). **Other species of Cypresses as substitutes for the Monterey.**—*Calif. Citrogr.*, xxiv, 6, pp. 199, 222–225, 5 figs., 1939.

After referring to the present situation with regard to the disease of Monterey cypress (*Cupressus macrocarpa*) in California caused by *Coryneum cardinale* [*R.A.M.*, xviii, p. 492], the author gives a preliminary report on the results obtained in ten test plantings started in various localities in an attempt to find a suitable substitute for the doomed species. Of the eight other kinds of native cypress tested, Gowen's (*Cupressus goveniana*) and Mendocino (*C. pygmaea*) were found to be susceptible to the disease and should therefore not be planted; McNab (*C. macnabiana*), Piute (*C. nevadensis*), and Modoc (*C. bakeri*) are likely to prove resistant but are too slow growing for windbreaks, while Sargent's (*C. sargentii*), Dutton's (*C. sargentii duttonii*), and Tecate (*C.*

forbesii) are probably immune from the disease and suitable for windbreaks and hedges, some of them growing more rapidly than the Monterey.

In an accompanying article by D. J. Thompson it is pointed out that eucalyptus is in many respects a satisfactory windbreak but that it has the disadvantage of being, in contrast to cypresses, a gross feeder, draining water and plant food from the adjacent citrus trees.

Schulze (B.), Theden (G.), & Vaupel (O.). **Röntgen-Interferenz-Untersuchungen einheimischer Holzarten im gesunden Zustand und nach Pilzangriff.** [X-ray interference studies on indigenous timbers in a sound condition and after fungal infection.]—*Holz Roh- u. Werkstoff*, I, pp. 75–80, 1938. [*Abs. in Zbl. Bakt.*, Abt. 2, c, 4–8, p. 174, 1939.]

A study of the X-ray diagrams of cross, radial, and tangential sections of spruce and pine blocks artificially inoculated with *Coniophora cerebella* [*C. puteana*], *Poria vaporaria*, *Merulius lacrymans*, and *Trametes pini* revealed extensive dissolution of cellulose by the three first-named, involving the total disappearance of this substance by the end of six months in the case of *P. vaporaria* on spruce and coinciding with progressive weakening of the interferences. *T. pini*, on the other hand, caused no alteration in the diagrams during the experimental period. The 'cord' mycelium of *M. lacrymans* produced the interferences characteristic of animal and vegetable chitin.

Hunt (G. M.). **Wood preservatives and their application.**—*Pests*, vii, 2, pp. 9–13, 1939. [Abs. in *Chem. Abstr.*, xxxiii, 11, p. 4400, 1939.]

The requirements for a good timber preservative are defined, and testing and application methods described in detail. The principal substances now in use include coal tar creosote, carbolineums, zinc chloride, chromated zinc chloride, and sodium fluoride, the characteristics of each of which are discussed. Clean, non-swelling preservatives are prepared by the solution of various toxic chemicals, e.g. penta- and tetrachlorophenol, 2-chloro-*o*-phenylphenol, β-naphthol [*R.A.M.*, xv, p. 658], and α-nitronaphthalene, in a volatile petroleum base. The compositions of some proprietary compounds are given.

Meyer (W.). **Fluorhaltige Holzimprägnierungsmittel.** [Fluorine-containing timber preservatives.]—*Farbenztg*, xliii, 52, pp. 1374–1375, 1938.

This is a summary and discussion of the official German regulations governing commerce in fluorine-containing timber preservatives.

Joyce (R.). **Economics of wood preservation in underground coal-mining.**—*Tech. Publ. Amer. Inst. Min. Engrs* 1067, 9 pp., 1939.

In 1928, 1929, and 1930, 223,258 mine ties impregnated by the full cell pressure process with a net retention of ½ lb. zinc chloride per cu. ft. were installed on main haulage in a group of bituminous coal mines. They cost $0·7133 each delivered at the mines, the corresponding

figure for untreated material being $0·4017. To date, two renewals have been spared by the treatment, representing cash savings of $366,835 for an added first charge of $69,602. Taking interest charges into consideration, the annual charges for untreated and treated ties are $0·2561 and $0·1323, respectively. In 1917 a few southern pine [*Pinus palustris*] ties impregnated by the Rueping pressure process with 8 lb. creosote per cu. ft. were laid down, the annual charge in this case being $0·14237 compared with $0·297 for untreated material. The estimated life durations of the zinc chloride- and creosote-treated ties are 12 (probably up to 16) and 20 years, respectively, compared with 3·7 and not over 4, respectively, for untreated. The replacement costs of oak bottoms of mine cars were $24·93 for creosoted and $19·56 for untreated, impregnation resulting, however, in a saving of $6·96 over 12 years. The annual charges per set of oak mine timbers installed in 1928 were $2·695 and $0·642 for untreated and creosoted, respectively.

WEGELIUS (T.). **Om röta i sulfitved och dess inverkan på fabrikationsprocessen och massautbytet.** [Sulphite wood decay and its influence on the manufacturing process and pulp yield.]—*Finsk PappTidskr., 1938*, 15 a, pp. 125–726, 128–130; 15, pp. 594, 595–598, 5 figs., 4 graphs, 1938.

The loss of coniferous wood on sorting the chips prior to processing in Finnish paper mills was found to be much higher in material damaged by fungal rots (*Polyporus* [*Fomes*] *annosus*, *Stereum sanguinolentum*, *Armillaria mellea*, *Ceratostomella piceae*, *C. coerulea*, and miscellaneous species of *Coniophora*, *Corticium*, *Lenzites*, &c.) than in sound wood, mainly owing to the profusion of fine particles in the softened chips. The pulp yield was consistently higher in sound wood, which also had a lower content of undefibred wood substance and was stronger and easier to bleach. The resistance of the sulphite cellulose to water, bases, and acids declined with an increase in chip decay. The degree of decomposition of the wood did not noticeably affect the cellulose, lignin, pentosan, resin, and fatty substance contents of the pulp, but the amount of ash rose with increasing deterioration. There was no appreciable reduction in the cellulose content even of badly decayed wood (94·4 as against 97·2 per cent. for healthy material), but the quality was impaired, more especially for rayon manufacture [*R.A.M.*, xvii, p. 239]. The α-, β-, and γ- cellulose contents of sound, somewhat decayed, and badly rotted wood were 87·5, 3·2, and 9·3; 75·8, 17·9, and 6·3; and 46·1, 48·6, and 5·3 per cent., respectively, from which it is apparent that fungal disintegration involves a fall in the α- and a corresponding rise in the β-cellulose contents of the wood.

WALKER (J. C.). **Diseases of vegetable crops.**—67 pp., 1939. [Mimeographed: obtainable from the author, College of Agric., Madison, Wisc., price $1·75.]

This is the first revised edition of the author's advanced course in vegetable pathology [*R.A.M.*, xv, p. 187], presenting in a succinct form the chief facts concerning the major diseases of 19 vegetable crops.

NUGENT (T. J.) & COOK (H. T.). **The use of chloropicrin as a seed treatment for black rot of Kale.**—*Larvacide Log*, i, pp. 114–119, 1 graph, 1938. [Mimeographed. Received May, 1939.]

A detailed, tabulated account is given of trials at the Virginia Truck Experiment Station in the control of black rot of kale [*Pseudomonas campestris*] by seed treatment with chloropicrin [*R.A.M.*, xviii, p. 443]. The seed was inoculated with a suspension of the organism and exposed to the gas at various concentrations in sealed tubes or flasks (the latter giving more uniform results) for 24 hours. Used at a strength of 0·88 c.c. per l. space, chloropicrin increased the number of sterile seeds from 2·9 (untreated) to 79·3 per cent., simultaneously reducing the incidence of [unspecified] fungal and bacterial contamination from 77 to 4·6 and from 43 to 16 per cent., respectively. *P. campestris* did not develop in any of the potato dextrose agar plates to which the treated seed was transferred. Mercuric chloride (1 in 1,000, 20 minutes' immersion) and hot water (122° F., 30 minutes) were similarly completely effective against black rot. The germination percentages for the chloropicrin, mercuric chloride, and hot water treatments were 64, 72, and 61, respectively, compared with 75 for the controls. In tests to determine the influence of the moisture content of the seed and of temperature on the chloropicrin-treated material very little injury was observed at the different concentrations (up to 3·52 c.c. per l.) with a moisture content of 6·5 per cent. even at the high temperature of 40° C., whereas at 14·5 per cent. practically all the seed was killed under the same conditions.

BENNETT (F. T.) & EDNEY (L. E.). **'Brown heart' of Swedes.**—*J. Minist. Agric.*, xlv, 12, pp. 1232–1239, 1 pl., 1939.

In field tests carried out in Cumberland in 1938 on the control of brown heart of swedes [*R.A.M.*, xviii, p. 364], the Tipperary, Edmonson's Jubilee, Monument, Garton's White-fleshed, and Great Scot varieties were grown in series of six $\frac{1}{5}$ acre plots, each of which received the usual manurial treatment and other dressings of equivalent amounts of nitrogen, phosphorus, and potash. In addition applications were made of basic slag, boronated basic slag (12$\frac{1}{2}$ cwt. per acre), borax (20 and 10 lb. per acre), and boronite (1 cwt. per acre, containing 17·85 per cent. borax); the average percentages of roots (all varieties together) badly affected by brown heart were, respectively, 59, 5, 4, 11, and 5, as compared with 51 per cent. in the controls. It is concluded that, in general, an application of 20 lb. borax per acre, or its equivalent in other materials, will give satisfactory control of brown heart of swedes under the conditions prevailing in Cumberland and Westmorland. Treatment with borax at £1 per cwt. costs under 4*s.* per acre apart from labour.

In general, purple-topped varieties suffer more severely than green-topped. In recent years the diminished use of manure and the greater chemical purity of artificial fertilizers have reduced the amount of boron in the soil, with a resultant increase in brown heart. Lime renders the boron compounds in the soil unavailable to plants, and where brown heart occurs, liming should be followed by a boron

corrective for the root crop, and if the application is heavy, the borax application should be correspondingly heavier, possibly up to 30 lb. per acre. Swedes may be severely affected by brown heart on acid soils, while beets and mangolds grown alongside show no symptoms of heart rot [ibid., xvii, p. 719].

WENZL (H.). **Schützt die Mosaikkrankheit der Rübe gegen Befall durch Cercospora beticola?** [Does the mosaic disease of the Beet confer protection against infection by *Cercospora beticola*?]—*Phytopath. Z.*, xii, 2, pp. 228–229, 1939.

The examination, in the autumn of 1938, of some 1,000 mosaic-diseased beets (mostly sugar) in 50 fields in the Upper and Lower Danube valleys, Austria, entirely failed to confirm Baudyš's observation in Czechoslovakia as to the immunity of such plants from infection by *Cercospora beticola* [*R.A.M.*, x, p. 78]. The attacks of leaf spot were equally heavy on mosaic and non-mosaic plants, involving both the old and heart foliage.

COONS (G. H.), STEWART (D.), & KOTILA (J. E.). **Sugar-Beet diseases. [ex Sugar-Beet culture in the humid area of the United States.]**—*Fmrs' Bull. U.S. Dep. Agric.* 1637, pp. 38–44, 2 figs., 1939.

The most important foliar disease of sugar beets in the humid area of the north-central United States is leaf spot (*Cercospora beticola*), which is thought probably to be present in every field each year, though a particular combination of climatic conditions is required to produce an epidemic. The fungus has been shown to persist on dried tops for at least three years. High temperatures are necessary for its rapid propagation, which is arrested by cool spring or summer weather. Rainy periods at intervals of a week or two and a warm spell in the first half of the growing period permit the organism to accomplish several successive cycles of increase and to spread throughout the field. Early attacks on the leaves result in reductions of both tonnage and sucrose, the latter also being sharply diminished by late infections. Early epidemics may reduce the root yields by two tons or more per acre and depress the sucrose percentage by upwards of two units, while for the average crop the combination of lowered root production and poor quality may cause a minimum loss of 25 per cent.

In areas where leaf spot is habitually prevalent, the regular application of Bordeaux mixture or copper dusts is justified and likely to produce definite gains, but where the disease is only of sporadic occurrence—as in Michigan, for example, where epidemics were reported in 1914, 1915, 1921, 1924, 1935, and 1937, with only localized damage in other years—direct control measures are uneconomical. A triennial crop rotation system should be adopted. The resistant variety U.S. 217 produced a highly satisfactory crop in the 1937 epidemic in Michigan.

Crop rotation is also an important factor in the control of the seedling diseases collectively known as damping-off or black root [*R.A.M.*, xviii, p. 441] and due to *Phoma betae*, *Pythium* spp. [including *P. de Baryanum*], *Rhizoctonia* spp. [including *Corticium solani*], and *Aphanomyces* spp. In general, sugar beet stands following maize are superior to those succeeding lucerne, sweet clover [*Melilotus alba*], and red

or crimson clovers [*Trifolium pratense* and *T. incarnatum*]. Adequate drainage, liberal applications of a phosphate fertilizer, prompt and thorough stirring and loosening to aerate and dry the soil, and selective thinning are also effective in the control of damping-off. The results of seed treatment with copper- or mercury-containing dusts are somewhat conflicting, no advantage accruing from the practice on certain soils, such as the Brookston clay of Ohio and heavy Michigan soils, whereas in those of a lighter type beneficial effects have been obtained. In order to secure good coverage the dusts should be used at the rate of 3 to 4 oz. per 15 lb. seed.

A note is given on the *Rhizoctonia* [*C. solani*] crown rot of mature beets [ibid., xviii, p. 494].

CORDON (T. C.) & HAENSELER (C. M.). **A bacterium antagonistic to Rhizoctonia solani.**—*Soil Sci.*, xlvii, 3, pp. 207–214, 1 pl., 1939.

A rough strain of *Bacillus simplex* was found to produce a diffusible, thermostable substance in both solid and liquid potato dextrose media which inhibited the growth or even caused the death of *Rhizoctonia* [*Corticium*] *solani*, isolated from diseased beans [*Phaseolus vulgaris*] at the New Jersey Agricultural Experiment Station. The bacterium developed in a nutrient agar culture on which tomato seeds had been plated and was probably carried on them as a contaminant. A nutrient medium in which *B. simplex* had grown contained such a high concentration of the toxic principle that it completely suppressed the development of the fungus after dilution to 5 per cent. of its original volume. The bacterium was also able to elaborate the toxic principle from Czapek's medium. The toxin is adsorbed by activated charcoal, from which it may be partially withdrawn by hot alcohol. It was not injured by the removal, by precipitation with alcohol or ammonium sulphate, of the bulk of the protein fraction from a nutrient medium made toxic to *C. solani* by the bacterium.

Treatment of a greenhouse soil infested by the fungus with a potato dextrose-peptone solution used for the culture of *B. simplex*, or with the living washed bacterial cells without nutrient medium, gave fair control of damping-off in cucumbers [ibid., xvi, p. 510] and peas [ibid., xvi, pp. 439, 611, *et passim*], which was also reduced to some extent by the fresh unused potato dextrose medium, possibly through encouragement of the saprophytic soil microflora. The following percentages of normal cucumber and pea seedlings were counted a fortnight after the various treatments: controls (tap water) 35 and 52 per cent., respectively, unused potato dextrose-peptone solution 65 and 55, the same at quarter strength 61 and 77, washed bacterial cells 58 and 75, autoclaved bacterial culture 55 and 80, the same at quarter strength 87 and 90, and the same, used continuously instead of tap water to maintain the moisture content during germination, 81 and 90.

EL-HELALY (A. F.). **Preliminary studies on the control of Bean rust.**—*Bull. Minist. Agric. Egypt* 201, 19 pp., 6 pl., 1939.

Bean (*Vicia faba*) rust (*Uromyces fabae*) is stated to be widely prevalent and to cause serious loss in Lower and Middle Egypt [*R.A.M.*,

xii, p. 749; xvii, p. 154]. In these localities incidence increases with the number of waterings given during the growing period. In one experiment, one watering (at sowing), two (sowing and flowering), two (sowing and pod formation), and three (sowing, flowering, and pod formation) gave, respectively, slight, severe, very severe, and very severe infection with average yields of 4·5, 4·8, 4·3, and 4·7, ardebs [1 ardeb = 1·98 hectol.] per feddan [0·42 hect.]. In Upper Egypt, where the disease is uncommon, soil moisture seems to have no effect on prevalence, high temperature being probably a limiting factor. Under Egyptian conditions, high atmospheric humidity associated with a strong north-westerly wind is conducive to severe outbreaks. Late sowings are usually more heavily infected than early ones.

Manurial applications and seed treatments with numerous materials had no effect on the disease. Very good control resulted, however, from four applications at fortnightly intervals of lime-sulphur (5 per cent. with 0·2 per cent. soap), sulsol (0·3 per cent. with 0·2 per cent. soap), bouisol (0·2 per cent.), and Bordeaux mixture (1 per cent.), which gave, respectively, 25, 35, 25, and 15 per cent. infection and average yields of 8·7, 7·6, 7·8, and 9·4 ardebs per feddan, as against 100 per cent. infection and a yield of only 5·1 ardebs per feddan in the untreated controls. Two applications of the same materials at weaker concentrations made at an interval of four weeks also gave very satisfactory results. The Bordeaux mixture and bouisol treatments in some cases gave an increase in net profit over the controls of 25 per cent. By delaying maturity, the copper sprays allowed the crop to ripen gradually and form large, unshrivelled seeds.

Yu (T. F.). **On the occurrence of Colletotrichum lindemuthianum (Sacc. & Magn.) on Broad Bean seeds.**—*Bull. Chin. bot. Soc.*, iii, 1, pp. 1–24, 2 pl., 3 graphs, 1937. [Received June, 1939.]

Colletotrichum lindemuthianum was isolated on potato dextrose agar and other media at 28° C. from broad bean seeds at Nanking University, this being apparently the first authentic record of the fungus on the host in question. The leaves of diseased plants bore circular, irregular, or angular, dark reddish-brown spots, 1 to 3 mm. in diameter, sometimes coalescing to form areas up to or exceeding 10 mm., the central portion turning cinnamon-buff to ashen-grey; similar but elongated or fusiform lesions, up to 1 cm. in length, are formed on the stems, while typical anthracnose spots with grey centres and red margins are also produced on the pods. Inoculation experiments on broad beans with spore suspensions under humid conditions resulted in the development of the characteristic symptoms after an incubation period of two to seven days, but all attempts to secure infection through the seeds were unsuccessful. None of the other Leguminosae inoculated with the broad bean strain of *C. lindemuthianum* proved susceptible. A full account is given of a comparative study on the broad and common bean (*Phaseolus vulgaris*) strains of the fungus, the pathogenicity of the latter being confined to different varieties of *P. vulgaris*. There were no conspicuous divergences between the two strains in respect of morphological and physiological characters.

WENCK (F.). **Lohnt sich die Bekämpfung der Blattfleckenkrankheit bei Sellerie?** [Does the control of Celery leaf spot pay?]—*Obst- u. Gemüseb.*, lxxxv, 3, p. 30, 1939.

In an experiment to determine the profitability or otherwise of fungicidal treatment for the control of celery leaf spot (*Septoria apii*) in the Ulm district of Germany [*R.A.M.*, xvii, p. 289], the yield of the area sprayed four times with 1 per cent. Bordeaux mixture amounted to 297·5 kg. per are, corresponding to an average rootstock weight of 633 gm. for the 470 plants comprising the stand. The untreated area yielded only 159·8 kg. per hect. (340 gm. each rootstock). The value of the 86 per cent. increased output of the sprayed area is estimated at RM. 550·80 per 0·25 hect., against which the costs of the treatment (RM. 34 per 0·25 hect.) are negligible.

STEVENSON (GRETA B.). **On the occurrence and spread of the ring spot disease of Lettuce caused by Marssonina panattoniana (Berl.) Magn.**—*J. Pomol.*, xvii, 1, pp. 27–50, 2 graphs, 1939.

Investigations [which are fully described] into lettuce ring spot (*Marssonina panattoniana* [*R.A.M.*, xiii, p. 668] showed it to be an important disease of winter lettuce in England, frequently causing marked reduction in the quantity and quality of the crop. It is seldom, if ever, found on lettuces headed out under glass, and is of minor importance on those grown in frames during winter and planted out in spring. Experimental evidence obtained during the years 1935 to 1938 demonstrated that the condition is seed-transmitted, the freedom or otherwise of the seed mother plants being strongly reflected in the ensuing crop; affected plants yield seed of high germinating ability and without surface blemish, but under suitable conditions, which frequently obtain in autumn, such seed produces a severely infected crop. On the other hand, seed from sprayed and segregated mother plants has given a crop almost free from infection whilst crops from commercial seed gave heavily diseased plants. Infection may also arise from the remains of an earlier, infected crop. The common weed *Crepis capillaris* may possibly be a source of infection. Sixteen commercial varieties tested were all highly susceptible. Under certain conditions the disease may remain latent for at least two months.

In a control experiment seed of the Commercial Market Favourite variety, untreated and treated with the supernatant liquid resulting from the mixture of bleaching powder with ten times its weight of water plus lethalate wetting compound (0·5 gm. per l.) was sown broadcast on a farm on 23rd October and one-third of the seedlings from each lot of seed was sprayed on 25th November and 31st December with Bordeaux mixture (3–6–50), another third with sulphur resin, and the remaining third left unsprayed. Of 204 seedlings transplanted from each treatment on 27th January, there survived on 3rd June 167 (92 diseased), 187 (27), and 192 (22) plants for the untreated seed unsprayed, sprayed with Bordeaux mixture, and sprayed with sulphur-resin, respectively, the corresponding figures for the seed treated with bleaching powder being 189 (34), 178 (12), and 173 (29). When similarly treated Imperial plants were left to overwinter in the

seed-beds and sprayed again on 14th March, the unsprayed plants from untreated seed were all badly diseased and brown, the Bordeaux-sprayed plants from the untreated seed mostly showed perforated leaves, but were green, while all the plants, sprayed and unsprayed, from the treated seed appeared clean.

It is recommended that lettuces grown in seed-beds until January or February should be sprayed with Bordeaux mixture (3–6–50), and that the seed used should be treated with bleaching powder solution, though further knowledge of the process is required to eliminate all risk of injury.

SNYDER (W. C.) & RUDOLPH (B. A.). **Verticillium wilt of Pepper, Capsicum annuum.**—*Phytopathology*, xxix, 4, pp. 359–362, 1 fig., 1939.

The results of soil inoculation experiments in California, herein briefly described, confirmed previous observations as to the acute susceptibility of chilli (*Capsicum annuum*) to *Verticillium albo-atrum* [*R.A.M.*, xvii, p. 372], the Anaheim variety being more severely attacked than the Red. The fungus was isolated from the small lateral rootlets of Dwarf Champion tomatoes planted in pots formerly occupied by infected chillis, but the tap-roots and main stems were not involved, nor did any clear-cut aerial symptoms develop.

WAKSMAN (S. A.) & CORDON (T. C.). **Thermophilic decomposition of plant residues in composts by pure and mixed cultures of micro-organisms.**—*Soil Sci.*, xlvii, 3, pp. 217–224, 1 pl., 1939.

A tabulated account is given of the activities of the thermophilic population of the straw and lucerne composts affording excellent growth of the edible mushroom (*Psalliota campestris*) at the New Jersey Agricultural Experiment Station [*R.A.M.*, xiii, p. 491] in the decomposition of plant materials, with special reference to *Thermomyces* at 50° C. [ibid., xviii, p. 342]. The presence of calcium carbonate was found to be essential for the rapid dissolution of plant residues as a whole, and of cellulose in particular, by the thermophilic fungi. *P. campestris* was found to derive its nutrients primarily from the lignin and its conversion products and from the proteins in the composts.

WILLIAMS (P. H.). **A Mushroom disease caused by Mycogone rosea.**—*Gdnrs' Chron.*, cv, 2729, p. 236, 1939.

Mushrooms [*Psalliota* spp.] recently received from Berkshire at the Cheshunt Research Station were found to be infected by *Mycogone rosea*, this being apparently the first authentic record of the fungus on the host in question. The surface of the caps was dark brown and the underlying tissue stained yellow. In some cases there were small depressions in the cap, below which the tissues were discoloured dark brown to a depth of about $\frac{1}{4}$ in.; in two instances alternate zones of brown and white marked the region of infection. *M. rosea* is readily distinguishable in culture from *M. perniciosa* [*R.A.M.*, xviii, p. 457] by its reddish- (instead of dark) brown coloration and its larger spores (upper and lower cells 35·5 and 20·8 μ in diameter in the former and 22·4 and 15·5 μ

in the latter). Positive results were obtained, after an incubation period of six to seven days, in inoculation experiments in which spores or mycelium of the fungus or small circles cut from a plate culture were placed on the surface of the cap.

Zycha (H.). **Mycologische Grundlagen der Champignon-Kultur.** [The mycological foundation of Mushroom cultivation.]—*Angew. Bot.*, xxi, 1, pp. 46–58, 5 figs., 1939.

In this general account of certain aspects of mushroom [*Psalliota* spp.] growing in Germany [cf. *R.A.M.*, xvii, p. 724], the following criteria are suggested for the differentiation of cultivated varieties: yield, the diameter of the cap, the height of the mushroom, the specific gravity of the unexpanded mushroom, the dry weight, the shrinkage and the firmness in preserving, the colour of the pileus, the sensitiveness to pressure as shown by discoloration, and susceptibility to certain insects. The nutritional requirements of the mycelium, the optimal conditions for the formation of fruit bodies (a regular and not too high rate of transpiration and constant conditions of humidity and temperature being of chief importance), and the diseases of the cultivated mushroom are also discussed.

Jenkins (W. A.). **The development of Mycosphaerella berkeleyii.**—*J. agric. Res.*, lviii, 8, pp. 617–620, 1 pl., 1939.

While the general plan of development of the spermogonia and perithecia of *Mycosphaerella berkeleyii* [the ascigerous stage of *Cercospora personata* on groundnut: *R.A.M.*, xvii, p. 651; xviii, p. 236] is stated to be almost identical with that of *M. arachidicola* [the ascigerous stage of *C. arachidicola*: loc. cit.], the former differed from the latter in the following details of structure and development: greater amounts of stroma surround the fruit bodies, the stromatic wall is thicker and the sterigmata longer, there are larger numbers of archicarps in the young perithecia and more fertile tissue in the base of the perithecium, periphyses are formed along the wall near the apex of the perithecium, and the ascospore discharge is somewhat protracted. In addition, the two fungi have already been found to produce different symptoms on their common host, and to differ in the type of conidial fructifications, host relationships, cultural characters, and ascospore dimensions.

Branas (J.), Bernon (G.), & Levadoux (L.). **Chronique. Sur les circonstances qui favorisent le développement du court-noué.** [Current notes. On the circumstances that favour the development of court-noué.]—*Progr. agric. vitic.*, cxi, 8, pp. 161–165, 1939.

The authors express the view that the fact that court-noué of the vine [*R.A.M.*, xviii, p. 294] is most prevalent in France in the most carefully tended vineyards is due to the deep digging over of the ground practised in such vineyards in winter. This digging amputates the roots to a depth of about 20 cm., and thus weakens the vines. Moreover, these superficial roots are infested with *Phylloxera vastatrix*, and as they wither after being cut off, the insects pass to the roots lower down, with the result that the more frequently the ground is dug over the more

often the vines become reinfected with the virus. In localities where the type of soil permits, deep digging should be abandoned.

Another practice that favours the development of court-noué is that of laying down a new vineyard immediately after an old infected one has been dug up, and on the same site, the new vines rapidly becoming infested by the insects from the old ones. Before replanting, sufficient time must be allowed to elapse for the old roots, and the insects on them, to die off.

The development of court-noué in a vineyard is closely related to the persistence of the amputated roots. The roots disappear most rapidly in loose, well-aerated soils free from excessive moisture, whereas in wet, compacted soils root debris persists for years. This explains why court-noué spreads chiefly in low-lying areas and damp plains.

Della Beffa (G.). **Cronaca delle malattie e dei parassiti osservati nell' anno 1938.** [Report on diseases and parasites observed in the year 1938.]—*Boll. Lab. sper. R. Oss. Fitopat. Torino*, xv, 3–4, pp. 153–162, 1938. (Issued 1939.)

In this report on plant diseases noted during 1938 in the vicinity of Turin it is stated that numerous cases of pear rust (*Roestelia cancellata*) [*R.A.M.*, ix, p. 602] occurred. The apple crop in one orchard was destroyed completely by a form of rot associated with a *Fusarium* which began as a brown discoloration of the floral remnants, spread in a circular manner, and caused the collapse of a large part of the fruit tissues. Chestnuts were widely affected by black rot due to *Sclerotinia pseudotuberosa* and *Phoma endogena* [ibid., xv, p. 616]. In some localities over 50 per cent. loss was sustained. A *Botrytis* was isolated from a soft, black, malodorous rot of chestnuts. *Piper guineense* plants from Kenya were attacked by *Pseudomonas* [*Bacterium*] *tumefaciens*, not previously recorded on this host.

Neergaard (P.). **Aarsberetning fra J. E. Ohlsens Enkes Plantepatologiske Laboratorium 1 April 1938–31 Marts 1939.** [Annual report of the phytopathological laboratory of J. E. Ohlsen's widow from 1st April, 1938, to 31st March, 1939.]—16 pp., 1 pl., 1 fig., 2 graphs, 1939. [English and Esperanto summaries.]

In addition to an item already noticed from another source, this report [*R.A.M.*, xvii, p. 654] contains the following information. Among the 4,132 samples of horticultural seeds and bulbs inspected were observed, for the first time in Denmark, *Ascochyta cheiranthi* on wallflower, *Colletotrichum spinaciae* on spinach [ibid., xvi, p. 299], mosaic on Hollandia Wedgwood iris [ibid., xvi, pp. 254, 728], *Phyllosticta antirrhini* on *Antirrhinum majus* [ibid., xviii, p. 458], *Stagonospora curtisii* [ibid., xvii, p. 42] on *Hippeastrum vittatum*, and *Alternaria brassicae* (Berk.) Bolle: ibid., xviii, p. 493] on *Iberis umbellata*, apparently a new host for this fungus. A species of *Alternaria* occurring on five samples of *Gypsophila elegans* and shown by inoculation experiments on its host to be an agent of damping-off, was characterized by concatenate, clavate, dark brown conidia, 30 to 60 by 12 to 27 μ (average 44·2 by 18·1 μ) with 3 to 8 (5·8) longitudinal and 2 to 8 (5) transverse

septa, provided in some cases with beaks measuring 3 to 27 μ (9·5 μ) in length.

Taxonomic studies were conducted on six isolates of *Alternaria radicina* from carrot [ibid., xvii, p. 703], celery, and flax are labelled *A. malvae* from *Malva* [ibid., xvi, p. 773], and a contamination in a fungus culture *Stemphylium botryosum* [ibid., xviii, p. 141] var. *botrytis*). The average dimensions of the conidia on malt extract, oat, potato, carrot, and maize agar ranged from 31·6±0·38 by 18·5±0·20 μ to 39·9±0·67 by 16·6±0·19 μ, and the average numbers of transverse and longitudinal septa from 2·9 to 4·4 and 2·5 to 3·3, respectively. It is concluded that all the isolates belong to different morphotypes of the same species, those from carrot I (isolated by Prof. J. Westerdijk in 1920) and *Malva* being of the same morphotype. The isolates under observation agreed well with the original diagnosis of *A. radicina*, whereas an examination of type material of *A. malvae* revealed marked differences between the conidia of the two species, those of the latter being paler and distinctly rostrate. *A. malvae* is accordingly retained as a good species and *A. radicina* transferred to *Stemphylium* (*Pseudostemphylium* sensu Wiltshire [ibid., xviii, p. 141]) as *S. radicinum* (M., D., & E.) nov. comb.

Progress Reports from Experiment Stations, season 1937–1938.—150 pp., 2 graphs, London, Empire Cotton Growing Corporation, 1939.

These reports [cf. *R.A.M.*, xvii, p. 455] contain, *inter alia*, the following items of interest. At Barberton, South Africa, *Alternaria* disease of cotton [loc. cit. and cf. ibid., xviii, p. 309] appeared towards the end of March, 1938; rapid spread was favoured by moist conditions in early April and by the reduced resistance of the plants, brought about by drought. The disease caused heavy loss of crop on parts of the loam soil where the plants were not well developed, but its effect was inappreciable on well-developed plants. On the granite soil the crop gave extremely good yields, none of the cotton suffering any ill effect from infection, probably because it benefited from the light showers that fell in the dry period between February and April. It is clear that resistance is closely associated with health, and all cotton lands are to receive regularly a compost dressing. A re-selection, 6128, made from 5143, has shown itself to be very resistant to drought and little affected by the disease.

Maize streak [loc. cit.] appeared late. Bulk plantings of the susceptible strains American White Flint and Anveld, sown on 29th and 30th November, showed virtually no infection throughout January, while plantings made on 4th January showed a mean infection of only 28·8 per cent. on 18th February. Out of 52 best selections of the variety Peruvian 39 lots had 100 per cent. uninfected plants.

In a seed disinfection test against cotton blackarm and bacterial boll rot [*Bacterium malvacearum*: ibid., xviii, p. 390] carried out in Swaziland, mechanically delinted seed from the previous season's crop was treated with proprietary mercurial dusts, a 'wet' mercury preparation (M12), sulphuric acid, and copper salts. The results showed that treatment with sulphuric acid, M12, and (to a less extent) the mercurial dusts conspicuously reduced primary infection. Sulphuric acid

increased the germination rate but not the total number of seedlings produced, the mercurial dusts made no significant difference in these respects, and both the copper salts and M12 retarded germination.

At Shambat, Anglo-Egyptian Sudan, the transference of blackarm resistance by repeated back-crossing was continued. Progenies of the composition X1530 × (X1530 × (X1530 × B. 31)) showed X1530 characters very strongly predominant, while plants showing resistance occurred within these progenies in numbers closely corresponding to the proportions expected. Similar results were given with back-crosses involving N.T. 2 strain, while more back-crossing on a large scale with both lines gave seed for sowing big progenies in the following season.

Evidence obtained in Uganda indicated that cotton wilt [*Verticillium dahliae* and *Fusarium* spp.: ibid., xvii, pp. 455, 504; xviii, p. 106] is more prevalent on fertile than infertile soils, increases in intensity near the bases of eroded slopes, and declines when cotton is grown year after year in the same plot. The Buganda Local strain shows more resistance than any Bukalasa Pedigree or introduced variety. The internal or chronic symptoms are probably present in over half the population of all Bukalasa Pedigree cottons and introduced varieties. The external or acute symptoms are more frequently present in the B.P. 50 family than in the B. 181 or the Nyasaland Upland families (S.G. 23/8 and B.P. 52). There is no evidence that more resistant populations are obtained by planting seed from plants that have remained healthy in diseased localities. Other work in Uganda showed that N. 17 and S.G. 29 are consistently more susceptible to blackarm than the S.P. varieties, that mass selection in N. 17 (N. 17/M. 1) did not give increased resistance, that S.P. 102 is the most resistant of all varieties tested, that S.P. 84 is more susceptible than S.P. 20 but more resistant than N. 17 and S.G. 29, and that B.P. 52 is more susceptible than N. 17.

The only important cotton disease observed during the season in Tanganyika was internal boll disease (*Nematospora* spp.) [*N. gossypii* and *N. coryli*: ibid., xv, p. 437; xviii, p. 308], which appeared in the Moshi area. In one locality, 40 acres were severely infected and produced only a negligible amount of lint. The only indigenous host of *N.* observed in the district concerned was an *Acacia*, a genus not before recorded as a host of *N.*

In further work in Tanganyika on cassava mosaic [ibid., xvi, p. 456; xviii, p. 373], in which two variety trials were harvested, one planted with diseased setts and the other with apparently clean material, the Mpera variety gave the best yield in both trials. Apparently there are a few tolerant varieties which give good yields under most conditions. A trial planted with setts, transplanted seedlings, and seed sown *in situ* showed conclusively that the best method of planting is by setts. Seed from clonal material of cassava varieties in the Tanganyika collection was sown between lines of diseased cassava, and over 1,000 single-plant progenies of seedlings that remained unaffected in 1937 were planted in progeny plots between other diseased rows in 1938. After three months only 5·8 per cent. of the plots were free from both mosaic and brown streak [loc. cit.]. Seven single-plant progenies unaffected in the second stage of the test in 1937 were planted in isolation, but all developed brown streak, though six remained free from mosaic.

HANSFORD (C. G.). **Report of the Senior Plant Pathologist.**—*Rep. Dep. Agric. Uganda, 1937–38* (Part II), pp. 20–25, 1939.

During the period under review preliminary cross-inoculation studies were carried out in Uganda with cultures of *Verticillium dahliae* [*R.A.M.*, xvii, p. 295] and numerous species of *Fusarium* associated with wilt diseases of cotton, simsim [*Sesamum orientale*], cassava, sann hemp [*Crotalaria juncea*], *Derris*, *C. striata*, *Capsicum annuum*, *Tephrosia vogelii*, and other plants. *V. dahliae* was isolated in the field from wilted plants of cotton, cassava, *S. orientale*, *Tephrosia*, and *Abroma*, while in inoculation tests in the laboratory it was pathogenic to young seedlings of these plants, as well as to *Capsicum* and *Crotalaria striata*. When seed of susceptible plants was sown in inoculated soil, infection by *V. dahliae* occurred in the absence of root injury, but a much larger proportion of infection resulted when the plants were grown for a few weeks in the pots before mixing the cultures with the soil, this operation damaging the finer roots. This supports earlier observations that infection by *V. dahliae* can often be traced to a damaged root. The wilt disease of *C. striata* due to a *Fusarium* of the *Elegans* group was found to be transferable to *C. juncea*, while the *Fusarium* isolated from *C. juncea* is also pathogenic to *C. striata*. Some individuals both of the original and alternate hosts appeared to show complete immunity. A much higher proportion of successful cross-inoculations was obtained in all cases when the plants were previously wounded.

Further foci of cotton wilt infection were discovered, the disease now having been recorded from nearly every important cotton-growing area in Uganda. As a rule, infection is confined to individual plants or small groups of plants, and is more serious only where the disease has been long established. On the whole, during 1937–8 it was of no economic importance.

Soil inoculations with mass cultures of *V. dahliae* resulted in a very low incidence of wilt, indicating that under field conditions this method is not a reliable test for resistance.

Isolations of *Bacterium malvacearum* [ibid., xvii, p. 392] from lesions on cotton plants at Kampala invariably gave cultures differing from the normal in the production of copious yellow slime on dextrose and saccharose media, and in forming no acid on dextrose media, while on nutrient agar they were a brighter yellow than normal strains isolated in previous seasons. The existence of variants in Uganda raises the question as to how far they differ in pathogenicity towards the cotton varieties developed locally for resistance to blackarm.

In December and January, cotton at Kampala was commonly affected by rust (*Kuehneola gossypii*) [*Cerotelium desmium*: ibid., xvii, p. 98], this being only the second record of the fungus in Uganda, but little damage was caused. The Uganda selections from U. 4.4.2 are more susceptible to *Cercosporella gossypii* [ibid., xvi, p. 838] than Nyasaland Upland or 'Buganda Local' selections. The only direct damage caused is due to boll infections, which are often invaded by bacteria.

During wet weather a number of selections of *Ricinus* [*communis*] were commonly affected by leaf spot due to *Bact. ricini* [cf. ibid., xiii, p. 565].

Tobacco mosaic was again a limiting factor in Ankale District, where, probably owing to climatic influences, it assumes a very serious form.

Sugar-cane mosaic is unimportant in Uganda [ibid., xvii, p. 296], as the varieties cultivated are very resistant or immune. Red stripe [*Bact. rubrilineans*: ibid., xv, p. 427] is, however, common on P.O.J. 2727, which is less resistant than P.O.J. 2725 and P.O.J. 2878. Several Coimbatore varieties are susceptible to *Cercospora sacchari* [ibid., xv, p. 607] as is also Uba, but no appreciable loss of crop is caused.

Cuttings of *Derris elliptica* at Kampala at first make fair growth, but later on the shoots die back almost to the base, and commonly show the presence of a *Diplodia* resembling the conidial stage of *Physalospora fusca* [ibid., ix, p. 344; xi, p. 697]; a *Fusarium* of the *Elegans* group has also been isolated.

Fifty-first Annual Report of the Kentucky Agricultural Experiment Station for the year 1938. Part I.—63 pp., [1939].

The following items occur in this report [cf. *R.A.M.*, xvii, p. 503]. After treatment with colchicin a few seeds were produced from the generally sterile F_1 hybrid of White Burley tobacco and *Nicotiana glutinosa* from which a fertile F_2 generation was grown. The fertile hybrid, which is to be used in breeding for mosaic resistance, contained two sets of chromosomes from tobacco (48) and two from *N. glutinosa* (24). The combination of the necrotic spotting factor from *N. glutinosa* and resistance from Ambalema was effected in several Burley strains. Twenty-one Burley selections containing the resistance factors from Ambalema were grown in the field and inoculated with a strain of white tobacco mosaic. Of 961 plants inoculated, 210 (or 21·8 per cent.) became invaded, ring patterns appearing as the leaves expanded. When cured the tobacco appeared to be of exactly the same quality as the standard Burley varieties. Similar results are being given by dark tobacco. It is considered that complete commercial control of tobacco mosaic may be obtainable by using resistant hybrids.

To secure mosaic-free tobacco for farm hands to chew while handling the crop a small block of Burley plants was inspected shortly before cutting and the mosaic plants were left unsuckered to be cut separately. One hundred and seventy twists of chewing tobacco made from the mosaic-free plants were found free from mosaic upon inoculation on *N. glutinosa*. This method could be used by growers to control mosaic.

Tobacco beds treated twice with Bordeaux mixture (3–3–50) showed no wildfire [*Bacterium tabacum*: ibid., xvii, p. 379; xviii, pp. 442 and 553] or angular leaf spot [*Bact. angulatum*: ibid., xvii, p. 776] at setting time, though about 75 per cent. of the untreated beds in the vicinity became attacked with one or other or both of these diseases.

In fields from treated beds, severe blackfire (*Bact. angulatum* and *Bact. tabacum*) damage began two weeks or more after it started in the fields from untreated beds, and on the whole the damage was less severe. In ordinary seasons, treatment of tobacco beds with Bordeaux mixture should give good control of these bacteria in the field.

Inoculations of dark fire-cured and air-cured tobaccos throughout the growing season in a plot low in fertility with single-colony cultures of *Bact. tabacum* or *Bact. angulatum* gave rise to the large, necrotic,

zonate spotting of blackfire. These symptoms were less frequently induced with the latter than with the former organism. Dark tobacco in a plot of medium fertility developed blackfire more readily after inoculation with *Bact. tabacum* or *Bact. angulatum* than did similar plants in a plot of high fertility. Wildfire was induced in tobacco by inoculation with *Bact. tabacum* cultures and angular leaf spot with *Bact. angulatum* cultures kept on beef-peptone agar or plain agar for 3½ years in an ice-box.

When the lower surface of tobacco leaves was exposed to a strong stream of water a mechanical injury was produced which resembled 'moonburn', a form of leaf spot frequently observed in the field after wind and rain. The lower surface was at first roughened, and in three or four days chlorotic and necrotic areas developed. Pathogenic organisms were not necessarily associated with either the field spots or the artificially induced spotting.

Report of progress for year ending June 30, 1938.—*Bull. Me agric. Exp. Sta.* 391, pp. 233–332, 6 figs., 1938. [Received May, 1939.]

This report [cf. *R.A.M.*, xvii, p. 377] contains the following items of phytopathological interest. Three years' comparative tests by D. Folsom of the effects of two different concentrations of lime-sulphur applied to McIntosh apple trees (24 years old in 1937) against scab [*Venturia inaequalis*] showed that, taking an average of the three years' results, the trees to which the mixture was applied at full strength (1 gal. liquid lime-sulphur, or 4 lb. dry lime-sulphur, per 50 gals. of mixture) had 1·9 per cent. scabby leaves, 38 per cent. burned leaves, 2·3 per cent. scabby fruits, 2·1 per cent. russeted fruits, and a yield of 7·8 bush. per tree, the corresponding figures for the trees to which the spray was applied at half-strength being 5, 28, 6·1, and 1·9 per cent., and 8 bush. The girth increase of the trees remained about the same for both treatments.

Observations on young McIntosh trees given the same treatment against scab annually for ten years showed that those given lime-sulphur, lime-sulphur following lead arsenate for eight years, followed by lime-sulphur alone for two years, sulphur spray, sulphur dust, and no treatment (controls) had made an average increase in trunk girth during the whole period of 4·66, 4·62, 5·05, 4·25, and 4·88 cm., respectively, the average yield for 1933 to 1937 (inclusive), being, respectively, 36·3, 51·5, 63·7, 75·5, and 44·6 lb. per tree, and the ratio of yield rate 1, 1·42, 1·76, 2·08, and 1·23.

Field surveys by R. Bonde and L. Schaal of the efficiency of the treatments of potato seed pieces against *Rhizoctonia* [*Corticium solani*] made by local growers showed that in many instances the methods adopted failed to kill the larger and medium-sized sclerotia. Soaking the seed pieces in mercuric chloride (1 in 1,000) for 1½ hours was more effective than using organic mercury compounds. Treatment in the autumn soon after digging did not injure the seed tubers and gave good control of infection, yield comparing favourably with that of tubers treated in the spring. In an investigation of the prevalence of *C. solani* in the soils of Aroostook County, Irish Cobbler potatoes selected as clean in the autumn were treated by prolonged soaking and planted on 34 different

farms. In 14 fields no disease developed; fields heavily cropped with potatoes for several years gave the heaviest tuber infection; tubers on virgin soil showed no infection; and fields previously cropped with hay or clover for two years were unaffected.

Applications to the soil of mercuric chloride and yellow oxide of mercury, each at the rate of 6 lb. per acre, 'zinc-mercury amalgam', formacide (6 lb.), and naphtha flakes (77 lb.) were made in two experiments to (*a*) soil heavily infected with *C. solani*, using healthy seed potatoes, and (*b*) soil relatively free from *C. solani*, using infected seed tubers. The results demonstrated that the three mercury compounds considerably reduced infection from both soil and tubers, and also significantly diminished the number and size of the sclerotia. Russeting of the skin was controlled, and the tubers when dug were brighter and more attractive than those from the control plots. On the other hand, the plants were stunted, and their growth was retarded and yield much reduced, though they gradually recovered from the dwarfing. The 'zinc-mercury amalgam' had a less toxic effect on growth than did mercuric chloride and yellow oxide of mercury. Formacide and naphtha flakes gave little control.

Ten years' studies by R. Bonde on Aroostook Farm showed that in normal years the spread of potato leaf roll, spindle tuber, and rugose mosaic is negligible. In 1937, however, mild mosaic, leaf roll, spindle tuber, and rugose mosaic were widely disseminated, the Katahdin variety being least affected. Harvesting before 1st September largely avoided these virus diseases. The abnormal spread of leaf roll in 1937 is largely attributed by G. W. Simpson to the presence in large numbers of *Myzus persicae*. Most of the spread appeared to occur from hill to hill. Leaf roll potatoes should be removed from the field in bags and disposed of in some place as far away as the rogued field is from other potato fields.

When colonies of *Myzus persicae* were reared on leaf roll plants and transferred to healthy hills (all of which were thinned to a single stalk) in lots of 1, 5, 10, 25, 50, 100, and 1,000±, the numbers of single stalk hills inoculated being 8, 56, 8, 8, 8, 8, and 4, infection occurred in 0, 52, 8, 8, 8, 8, and 4 hills respectively. A similar experiment with *Macrosiphum solanifolii* gave completely negative results.

KEUCHENIUS (A. A. M. N.). **Overzicht van de ondernemingscultures in het rayon West-Sumatra gedurende 1938.** [Survey of the plantation crops in the West Sumatra region during 1938.]—*Bergcultures*, xiii, 18, pp. 569–576, 1939.

Cinchona in reclaimed forest clearings in West Sumatra was attacked by the root fungi *Rosellinia bunodes*, *R. arcuata* [*R.A.M.*, x, p. 298; xvi, p. 160], a brick-red *Poria*, and *Armillaria mellea* [loc. cit.], while isolated cases of *Polyporus rubidus* [ibid., xvii, p. 162] and *Fomes noxius* [ibid., xviii, p. 137] were found. Some damage was caused among seedlings by *Rhizoctonia* [*Corticium*] *solani*. Clone RG1 showed periodical foliar infection by a *Phyllostictina*. Four-month-old plants in a sickly, backward condition were found to be invaded by *Helminthosporium* and *Fusarium*. *C. salmonicolor* [ibid., x, p. 298] was responsible for stem and branch die-back in plantings where timely thinning-out

was neglected. Both *Cinchona ledgeriana* and *C. succirubra* suffer from an obscure disease, known as stem rust, stem canker, or stripe canker, characterized by the presence on the main stems of the rust-coloured deposits of a reddish-brown exudate, and in the later stages by cankers on the bast and death of the bast, cambium, and outer xylem tissues.

Fomes noxius was the most prominent fungal parasite of coffee roots [ibid., xvii, p. 162] during the period under review.

Rubber [*Hevea brasiliensis*] in cleared areas was attacked by *Ganoderma pseudoferreum*, *F. lignosus* [ibid., xviii, p. 341], *Xylaria thwaitesii* [ibid., xvi, pp. 160, 798], and *Ustulina zonata* [ibid., xvii, p. 343]. Good control of the leaf spots caused by *Phyllosticta heveae* [ibid., xvii, p. 843], *Colletotrichum heveae* [ibid., ix, p. 64], and *Fusarium* was obtained by several applications of 0·05 per cent. cryptonol [ortho-oxyquinoline sulphate: ibid., xviii, p. 554].

The following root fungi (in order of their importance) occurred on tea: *Rosellinia bunodes* and *R. arcuata* [ibid., xvii, p. 202], *A. fuscipes* [or *A. mellea*: ibid., xvii, p. 202; xviii, p. 452], *F. noxius* [ibid., xviii, p. 504], *U. zonata* [ibid., xvi, p. 129; xviii, p. 504], *Poria* and *G. pseudoferreum*, and *Helicobasidium compactum* [ibid., xviii, p. 546]. *Asterina camelliae* [ibid., xvii, p. 162] and *Pestalozzia* [*theae*: ibid., xvii, p. 71] were prevalent on tea foliage, the former also occurring on *Albizzia falcata* and the latter on lamtoro [*Leucaena glauca*]. On one estate *C. camelliae* [*Glomerella cingulata*: loc. cit.] caused defoliation of weakened bushes eight to ten months after pruning.

Crown rot of oil palms [ibid., xv, p. 147] was more in evidence in forest clearings than on land formerly occupied by alang-alang [*Imperata arundinacea*].

Schoonevelt (J. C.). **Beknopt overzicht van de meerjaarige cultures in het rayon Buitenzorg over 1938.** [A concise survey of the state of the crops of several years' standing in the Buitenzorg district in 1938.]—*Bergcultures*, xiii, 19, pp. 606–608, 1939.

Both red [*Ganoderma pseudoferreum*] and white [*Fomes lignosus*] root rots of rubber [*Hevea brasiliensis*: see preceding abstract] were observed in plantations up to nine years old on reclaimed areas, while on old estates, especially in the vicinity of Buitenzorg and Bantam, the virulence of the former organism continues unabated. Remedial measures in the form of root exposure in two rows of trees surrounding diseased individuals have been widely adopted. Good control of stripe canker [*Phytophthora palmivora*] was given by the application to the infected tissues of a mixture of Socony product 2295 A and 3 per cent. carbolineum plantarium [ibid., xvi, p. 634; xvii, p. 343]. The same mixture may be used for the protection of the cuts made in the excision of bast tissues in grafts invaded by *Diplodia* [*Botryodiplodia theobromae*] after disinfection with 20 per cent. carbolineum or 5 per cent. izal.

Red root rot [*G. pseudoferreum*] still constitutes a problem in tea plantations [see preceding abstract] where infection is spread by old wood debris in the soil or diseased *Albizzia* [*falcata*] roots. Pruned bushes were attacked through the wounds by *B. theobromae* [ibid., xvii, p. 71].

Levine (M.). **Crown gall-like tumors induced with scharlach red on the plant, Kalanchoë.**—*Proc. Soc. exp. Biol., N.Y.*, xl, 4, pp. 599–603, 4 figs., 1939.

A lanoline paste containing 1 to 2 per cent. of scharlach [scarlet] red when applied to decapitated shoots of *Kalanchoë daigremontiana* at the Montefiore Hospital, New York, induced the formation of overgrowths with leafy shoots and roots resembling the typical crown galls of *Pseudomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, xviii, p. 446]. Other carcinogenic agents, e.g., 1, 2, 5, 6-dibenzanthracene, methylcholanthrene, and benzpyrene, similarly applied in lanoline, cause injuries to the treated *K.* stems without the formation of excrescences, roots being produced above and below the sites of application. Indoleacetic acid (3 per cent.) induces on the same plant a profusion of long, white roots and small, short-lived intumescences. Roots are also produced on injured *K. daigremontiana* plants treated with lanoline alone. It is concluded that root formation in these experiments (except in the case of the heteroauxin, indoleacetic acid) results from injury stimulating the plant cells to secrete root-producing substances, which are conveyed to portions of the stem above and below the treated areas.

Le principali malattie crittogamiche dei cereali. [The principal cryptogamic diseases of cereals.]—*Ital. agric.*, lxxv, 12, pp. 887–888, 1 col. pl., 1938.

Brief, semi-popular notes are given on the following cereal diseases in Italy: black, brown, and yellow rusts (*Puccinia graminis* on wheat, [*P. triticina*] on wheat, and *P. glumarum* on rye and wheat), *Helminthosporium gramineum* (barley, wheat, and oats), *Cladosporium herbarum* (general), loose smut of wheat (*Ustilago tritici*), maize smut (*U. maydis*) [*U. zeae*], and 'brusone' of rice (*Piricularia oryzae*) [*R.A.M.*, xvii, p. 61; xviii, p. 546].

Stevens (N. E.). **Disease, damage and pollination types in 'grains'.**—*Science*, N.S., lxxxix, 2311, pp. 339–340, 1939.

In this note the author suggests that the amount of matter published on various diseases of economic crops indicates their relative economic importance, and gives disease indices for grain crops of the U.S.A. for the period 1910 to 1919 obtained by dividing the number of pages published by the value of the crop concerned in millions of dollars: flax 14·2, rice 4·9, barley 3·5, wheat 3·4, sorghum 2·3, oats 1·8, rye 1·5, maize 0·8, and buckwheat 0, while the figures computed on the same basis for fruit and potatoes were over 30 and over 20, respectively. Attention is drawn to the striking correlation between the high disease indices and self-pollination, and low indices and cross-pollination.

Fedorintchik (N. S.). **Darluca filum (Cast.)** в борьбе с ржавчиной. [*Darluca filum* (Cast.) in the control of rust].—*Pl. Prot., Leningr., 1939*, 18, pp. 61–70, 5 figs., 1939. [English summary.]

Pycnidia of *Darluca filum* [*R.A.M.*, xvi, p. 279] were observed on the pustules of various rust fungi on cereals and also sometimes directly on the leaves of the host plants. When wheat plants in pots were inoculated

with *D. filum* either simultaneously with, or following inoculation by, *Puccinia triticina*, the plants became infected with *D. filum*, whereas those inoculated with *D. filum* only showed no signs of infection. It is concluded that *D. filum* is parasitic on the rusts but not on the host, and that it feeds both on the rust spores and on the intercellular mycelium. The spores of *D. filum* began to germinate after three hours at temperatures from 15° to 25° C. The optimal temperature for germination was 20° to 21°, but large numbers of spores germinated at temperatures between 12° and 26°. It is pointed out in this connexion that the temperature conditions of almost all districts of the Soviet Union where rusts are distributed would be favourable for the development of the fungus. The incubation period of *D. filum* at a mean daily temperature of 22·4° and relative air humidity of 70 to 100 per cent. was nearly the same as that of *P. triticina*, namely, five to six days; at temperatures from 8° to 35° it varied from four to seven days. Artificial infection with *D. filum* material from rust of wheat was successful on *P. dispersa* [*P. secalina*] on rye, *P. simplex* [*P. anomala*] on barley, *P. graminis* on oats, and *P. coronifera* [*P. coronata*] on oats and *Agropyron repens*. In nature *D. filum* was found to develop most intensely under conditions of high relative humidity, principally in low-lying sites and during spring and autumn. In order to obtain sufficient amounts of *D. filum* for inoculation under field conditions, a nursery of wheat plants infected with rust was established, but the material obtained was never quite free from rust and was, therefore, considered unsuitable. Good results were obtained in preliminary tests with infected wheat leaves dried at a temperature of 30° and a relative humidity of 30 per cent. for 20 days, when the rust uredospores lost their viability but the pycnidia of *D. filum* survived and could then be used for inoculation in form of a water suspension, sprayed at the rate of 100 l. per hect.

Tupenevitch (S. M.) & Shirko (V. N.). Мероприятия по борьбе с гибелью озимых весной от **Sclerotinia graminearum Elen.** [Measures for preventing losses of winter cereals in the spring from *Sclerotinia graminearum* Elen.]—*Pl. Prot., Leningr., 1939*, 18, pp. 85–99, 5 figs., 1939. [English summary.]

Losses of winter cereals due to *Sclerotinia graminearum* [*R.A.M.*, xvi, p. 526 and next abstracts] amounted in 1936 to 2·95 per cent. of the area sown in the Kirov region of the U.S.S.R. and to 3·31 per cent. in the Udmurtskaya Autonomous Soviet Republic. Sclerotia of the fungus develop on the leaves as well as inside the stems of the plants. Die-back of the plants occurs after thawing of the snow and also somewhat later during growth. On well-cultivated soils some plants recover and give normal yields, whereas on poor soils partially recovered plants usually die in a later stage. Germination of the sclerotia in nature takes place in autumn and requires light, high humidity of soil surface (about 70 per cent.), and not too high average day temperatures (1·2° to 12° C.). Young sclerotia do not germinate. Mature sclerotia which fail to germinate in the autumn of the first year are capable of overwintering and germinate in the autumn of the following year. The development of the mycelium of the fungus in nature occurs at a temperature little above 0° and under conditions of high air humidity. The fungus infects

winter wheat and rye, timothy [*Phleum pratense*], French rye grass [*Arrhenatherum avenaceum*], and other grasses, but has not been observed to attack summer crops. The recommendations for the control of the disease include crop rotation; application of manure and other organic fertilizers (composted turf, green lucerne); liming of acid soils; draining of excessively moist fields and accelerating the melting of snow by scattering fine peat over it; deep and early ploughing of fields where winter crops were badly affected by the disease in order to prevent germination of sclerotia in the autumn; eradication of susceptible cereal weeds; harrowing of winter sowings in the spring; burning of dry leaves with sclerotia collected during harrowing; and growing of resistant varieties. In 1934, during a serious outbreak of the disease, the varieties Erythrospermum 0529 and Lutescens 0116 appeared to be very resistant.

Solkina (Mme A. F.). К изучению цикла развития гриба **Sclerotinia graminearum Elen.** [A study of the cycle of development of the fungus *Sclerotinia graminearum* Elen.]—*Pl. Prot., Leningr., 1939*, 18, pp. 100–108, 1 fig., 1939. [English summary.]

In a study on *Sclerotinia graminearum* [see preceding and next abstracts] the fungus was grown on beer wort-peptone agar and on sterile grain. The mycelium began to grow six days after sowing the ascospores, and sclerotia (somewhat larger than in nature) developed 19 days later. At about the same time a microconidial stage was formed, and apothecia appeared about four months after sowing. A comparison of the fungus with related species revealed a certain similarity to *S. borealis* [*R.A.M.*, xviii, p. 298], but on the whole seemed to justify the opinion of P. F. Eleneff, who first named *S. graminearum* in 1919 (according to his account the fungus was first found in 1901 by Mme N. I. Troussova), that it represents a distinct species. It is suggested, however, that pending further studies the systematic position of the fungus should not be considered as finally established. No description of the fungus having been published by previous workers, a Latin diagnosis is now furnished. The apothecia of the fungus are at first cyathoid, then flattened, with a cylindrical stipe, up to 15 mm. long. The disk is 2·5 to 6 mm. in diameter and yellowish-brown. The eight-spored asci are cylindrical with rounded ends, 175 to 300 by 10 to 14 μ (average 225 by 13 μ), the apical pore staining blue with iodine. The spores are uniseriate, hyaline, inequilateral, 16 to 23 by 7 to 10 μ (average 18 by 8 μ). The paraphyses are filiform, slightly broadened at the apices, and hyaline. The microconidia are globose, 2 μ in diameter, hyaline, and uniguttulate, and the conidiophores are irregularly branched. The sclerotia are tuberiform, black, 1 to 6 by 1 to 3 mm.

Experiments under natural conditions showed that the germination of the sclerotia was adversely affected by storing for seven to ten months in a dry state. Germinating sclerotia dried to an air-dry condition and stored for $2\frac{1}{2}$ months continued to germinate normally when again exposed to moisture. The asci are formed mainly in autumn subject to a favourable combination of humidity and temperature. The optimum temperature for ascospore germination is 3° to 16° C., the process declining at higher temperatures and ceasing altogether at 30°, while freezing to —3° did not kill the spores.

Yakovleff (A. G.). К изучению биологии склеротинии на озимых **(Sclerotinia graminearum Elen.)**. [A study of the biology of *Sclerotinia graminearum* Elen. on winter cereals].—*Pl. Prot., Leningr., 1939*, 18, pp. 109–112, 1 fig., 1939. [English summary.]

In germination experiments with *Sclerotinia graminearum* [see preceding and next abstracts] it was shown that a period of exposure to sunlight is necessary for the germination of the sclerotia of the fungus. Sclerotia allowed to ripen in the field during the summer and collected in the autumn germinated up to 20·5 or 27·7 per cent., while of those collected in the spring not more than 2 per cent. germinated. Germinating sclerotia showed positive phototropism. Under conditions of insufficient light on short December days the apothecia yielded no spores. In nature the sclerotia form bright yellow apothecia. The fungus develops most profusely on highly acid soils.

Fokin (A. D.). Метеорологические условия массовых вспышек склеротинии на озимых **(Sclerotinia graminearum Elen.)**. [Meteorological conditions governing mass outbreaks of *Sclerotinia graminearum* Elen. on winter cereals.]—*Pl. Prot., Leningr., 1939*, 18, pp. 113–120, 5 graphs, 1939.

A study of the meteorological data of the Kirov region of the U.S.S.R. showed that the autumns preceding serious outbreaks of *Sclerotinia graminearum* [see preceding abstracts], which occurred in 1903, 1909, 1934, and 1936, were characterized by very high relative humidity (maximum 100, minimum 70 to 80 per cent.). It is suggested that during warm, moist autumn weather, the sclerotia germinate and infect the young plants by ascospores or mycelium; the subsequent fall of temperature and the first night frosts weaken the infected plants, the following cool weather and heavy precipitations favour the development of the fungus inside the plants, which thus enter the snow period in a very weakened condition. The short period between the melting of the snow and the formation of sclerotia, which is believed to be the final stage in the life-cycle of the fungus, is not favourable to its development, as the humidity of the air at that time rarely exceeds 50 to 60 per cent. It is not considered, for that reason, to be a decisive phase in the pathogenic activity of the fungus. The death of the plants may be due to either meteorological factors during the winter or to the ability of the fungus to develop at low temperatures under the snow.

Bever (W. M.). **Reaction of Wheat, Barley, and Rye varieties to stripe rust in the Pacific Northwest.**—*Circ. U.S. Dep. Agric.* 501, 15 pp., 1938. [Abs. in *Exp. Sta. Rec.*, lxxx, 5, p. 639, 1939.]

The author carried our field and greenhouse studies on the reaction to *Puccinia glumarum* [*R.A.M.*, xviii, p. 300] of 317 wheat varieties grown in the United States and 1,284 foreign introductions, 365 barley, and 11 rye varieties. The greenhouse experiments were confined to seedling reactions, those in the field to the soft-dough stage. Physiologic race 19 provided the inoculum in the greenhouse tests, and field infection was obtained from natural sources.

Of the commercial winter wheats the most resistant were Blackhull, Cheyenne, Kanred, Oro, Ridit, and Turkey (C.I. 6175) in the hard red winter class, and Fulhio, Nittany, and Red Rock in the soft red winter class. The Defiance, Dicklow, and Irwin Dicklow white spring wheats, and the Democrat, Eaton, Hard Federation × Martin, and Rex selection (C.I. 11689) white winter wheats were resistant. The Club wheats were the most susceptible, only Big Club being resistant in both the seedling and soft-dough stages. Of 14 durum wheats studied, only Kubanka, Mindum, and Monad were susceptible in the field, Mondak and Nodak being susceptible only in the seedling stage. Approximately half the 365 barley varieties tested in the greenhouse showed an immune type of reaction, while Winter Club, Hannchen (C.I. 602), Meloy, Horsford, and Wisconsin Pedigree 38 barleys were resistant. All the rye varieties tested except Prolific Spring were immune or resistant.

Vallega (J.). **Dos nuevas selecciones de Trigo de origen hibrido imunes a 'Puccinia glumarum'.** [Two new Wheat selections of hybrid origin immune from *Puccinia glumarum*.]—*Rev. Fac. Agron., La Plata*, Ser. 3, xxii, pp. 139–145, 1938. [Received July, 1939.]

Particulars are given of two wheat selections, I.F. 301 and I.F. 293, resulting from hybridization between the Chino 166 winter wheat and Lin Calel, a common Argentine native variety, which have inherited the immunity from yellow rust (*Puccinia glumarum*) [*R.A.M.*, xiv, p. 500] of the male parent and are likely to prove of great use in further breeding operations.

Maklakova (Mme G. F.). Оценка агротехнических приемов как мероприятия против ржавчины Пшеницы. [Estimation of agrotechnical methods as measures against Wheat rust.]—*Pl. Prot., Leningr., 1939*, 18, pp. 77–84, 1 graph, 1939. [English summary.]

Field investigations carried out by the Pan-Soviet Institute of Plant Protection in various parts of the Union showed that the application of fertilizers (particularly stable manure at the rate of either 40 or 20 zentner [2,000 or 1,000 kg.] per hect. or complete artificials) considerably increased the yields of summer wheats, but had little effect on the incidence of brown rust (*Puccinia triticina*), on which the date of sowing, on the other hand, exerted a considerable influence. In the Voronezh district the incidence of brown rust on unfertilized plots of summer wheat Caesium 111 sown on 14th April was 10·9 per cent. on 7th July, 22·5 per cent. on 18th July, and 75 per cent. eight days later, while the corresponding figures for wheat sown on 4th May were 16·2, 41·6, and 93·3 per cent. On fertilized plots the incidence was considerably lower than on unfertilized ones in the earlier sown and equally high in the later sown wheats. The yields amounted to 14·2 and 8·4 zentner per hect., respectively, in the earlier sown, and to 9·3 and 7·1, respectively, in the later sown wheats. Similar results were obtained with summer wheats in the Leningrad district. Winter wheats sown early were more intensely attacked by rust, but yielded considerably more than later sown ones.

Barmenkoff (A. S.). Оценки поражаемости стандартных и перспективных сортов Пшеницы наиболее распространенными в СССР расами **Puccinia triticina Erikss.** [Evaluation of the damage caused to the standard and new Wheat varieties by the most widespread races of *Puccinia triticina* Erikss. in the U.S.S.R.]—*Pl. Prot., Leningr., 1939*, 18, pp. 158–161, 1939.

Of the 79 winter and summer standard wheat varieties artificially infected at an early stage of growth with the eight most common races of *Puccinia triticina* in the U.S.S.R. [*R.A.M.*, xvii, pp. 436, 437], only two (Kanred×Fulcaster 266319 and 266287) proved to be highly resistant to all eight races (Nos. 10, 13, 20, 17, 65, 66, 67, and 69), while 60 were highly susceptible and 17 varied in their reaction to the different races.

Pal (B. P.) & Mundkur (B. B.). **Studies in Indian cereal smuts. I. Cereal smuts and their control by the development of resistant varieties.**—*Proc. Indian Acad. Sci.*, Sect. B., ix, 5, pp. 267–270, 2 pl., 1939.

After pointing out that cereal smuts in some years cause great loss in certain parts of India, the authors present some introductory notes on systematic efforts to study the resistance of the different cereals to their respective smuts and to develop new resistant varieties that have recently been begun at Delhi. It has already been ascertained that the spores of covered smut of oats (*Ustilago kolleri*), when kept under laboratory conditions at Delhi and Pusa, lose their viability in three or four months. The spores of covered smut of barley (*U. hordei*), on the other hand, have remained viable under the same conditions for four years, with no loss in germinability. Evidence has been obtained that resistance trials are of no practical value unless at least 60 to 70 per cent. infection is induced on the susceptible varieties used. In the authors' work, 100 per cent. infection by loose smut (*U. tritici*) was secured on certain wheats, e.g., Punjab C. 591, while a few, including Pusa 114 and Pusa 165, were completely resistant.

Fellows (H.) & Ficke (C. H.). **Soil infestation by Ophiobolus graminis and its spread.**—*J. agric. Res.*, lviii, 7, pp. 505–519, 1 diag., 1939.

The results of pot experiments on the mode of spread of take-all of wheat (*Ophiobolus graminis*) [*R.A.M.*, xviii, pp. 241, 515] in the soil showed that in the greenhouse at least 25 per cent. by volume of infested soil had to be incorporated in a mixture of infested and uninfested soil in order to produce an appreciable amount of disease in Kanred wheat. In a mixture containing 30 per cent. infested soil the infestation increased in five successive wheat crops, while no increase was observed after four years with a 15 per cent. dosage. It is assumed that in the field an even greater percentage of infested soil would be required to produce serious damage, though the infestation in both mixtures was much greater than would occur by soil transference under natural conditions. The addition of water suspensions of infested soil to non-infested produced infection in the greenhouse when cropped with wheat during two years.

In the field a light sprinkling of non-infested soil with infested soil, to simulate wind blowing, failed to produce infection during three years' cropping, but when the same soil was removed to the greenhouse the second crop grown on it became diseased. No spread of infection occurred when infested and non-infested soils were placed in contact without mixing, but infection took place when wheat roots were allowed to penetrate both soils, more infection being spread both laterally and vertically when the roots grew from non-infested into infested soil than in the opposite direction. Infested soils were found to lose their infestation when brought into contact with non-infested soils in the field or greenhouse, and infestation seems also to disappear from affected spots in the field. In the greenhouse infection resulted from mixing stubble and roots from diseased plants with sterilized soil or placing perithecia of the fungus on the surface of the soil near the base of wheat plants, but no disease developed in field experiments. Infection lasting for five years was obtained in both greenhouse and field with cultures of the fungus grown on a barley-oats medium. It is concluded from these results that the infected roots of the living plant are probably the best carriers of infection to non-infested soil, and this explains why crop rotation is an effective measure of control, particularly in the Middle West of the United States.

Bockmann (H.). **Möglichkeiten zur Verhütung der Halmbruchkrankheit bei Getreide.** [Possibilities of control of the straw-breaking disease of cereals.]—*Pflanzenbau*, xv, 11, pp. 403–430, 6 figs., 1939.

This is a comprehensive, fully tabulated account and discussion of the writer's experiments in Schleswig-Holstein on the control of straw-breaking or [eyespot] lodging in wheat (Peragis summer and Carsten V and Mahndorfer Tempo winter) caused by *Cercosporella* [*herpotrichoides*: *R.A.M.*, xviii, p. 448] by the regulation of sowing operations in respect of density, depth, and time. The first-named is the most important of the three factors. No hard-and-fast rule can be laid down for the quantity of seed-grain to be used, since the local environmental conditions vary greatly, sometimes even from one farm to the next: a rate of 160 kg. per hect., however, may serve as the normal standard, to be reduced where outbreaks of the disease are known to threaten. Shallow ($\frac{1}{2}$ to 1 cm.) and late (middle of October to mid-November) sowing are contributory measures towards the lessening of infection, but their beneficial effects are not so clear-cut or well-established as those of a normal to thin planting rate.

Frickhinger (H. W.). **Die Federbuschsporen-Krankheit.** [The plumed spore disease.]—*Dtsch. landw. Pr.*, lxvi, 14, p. 176, 1939.

A semi-popular note is given on the plumed spore disease [twist] of cereals (chiefly wheat and spelt, though rye and oats are also liable to infection) caused by *Dilophospora alopecuri* [*R.A.M.*, xvi, p. 184], which was first observed in Germany after the world war, since when it has been responsible from time to time for losses of up to 30 per cent. of the crops in various parts of the country.

Shitakova-Roussakova (Mme A. A.). Поражаемость сортов Ржи пятнистой болезнью **(Scolecotrichum graminis Fuckel)** в условиях Отрады Кубанской. [The susceptibility of Rye varieties to the spot disease (*Scolecotrichum graminis* Fuckel) under conditions of the Otrada-Kuban selection farm.]—*Pl. Prot., Leningr., 1939*, 18, pp. 71–76, 1 fig., 1939. [English summary.]

Field observations in 1931 showed that some rye varieties had suffered rather seriously from the spot disease caused by *Scolecotrichum graminis* [*R.A.M.*, xii, p. 395]. At the end of the flowering stage the fifth leaves (counting from the top) were affected up to 0·7 of their surface, the third up to 0·4, and even the second and the top leaves were slightly injured (0·01 of the leaf surface). Of the rye varieties tested Lissitzinskaya, Vyatskaya, and Rosen were the most intensely, and Tarashtshanskaya and Petkuskaya the least affected, an average of 0·5 of the surface of all leaves being injured in the first three and 0·2 in the last two varieties. After the end of the flowering stage (30th May) the lower leaves gradually dried up and the spotting became less conspicuous and disappeared entirely by 20th June. The disease is believed to be potentially harmful in years favouring its development, particularly in northern districts of the Soviet Union where it may become not less serious than rusts. The disease is fairly widely distributed throughout the Union.

Kuprewicz (V. F.) & Khilimonova (Mme V. I.) К биологии листовой ржавчины Ржи **Puccinia dispersa Erikss.** [On the biology of leaf rust of Rye, *Puccinia dispersa* Erikss.]—*Sovetsk. Bot., 1939*, 1, pp. 98–99, 1939.

The results of field investigations carried out from 1934 to 1936 in the Minsk district of the U.S.S.R. showed that uredospores of brown rust of rye (*Puccinia dispersa*) [*P. secalina*: *R.A.M.*, xiv, p. 292] can withstand a temperature of —26° C. under loose and dry snow, but perish when excessive soil moisture induces the formation of an ice cover. With the advent of the first warm days in spring the proportion of living uredospores is drastically reduced. Uredospores collected from under snow on 22nd January, 18th and 28th February, and 7th March gave 87 to 90, 44 to 48, 10, and about 0·1 per cent. germination, respectively, whereas in the case of uredospores on leaves frozen in the ice cover only those collected on the first date germinated up to 30 to 35 per cent., and none of those collected on later dates. No living spores were subsequently found till 5th May, when a few uredosori were observed on the dying leaves nearest to the ground [cf. ibid., xiii, p. 82].

Reed (G. M.). **Reports on research for 1938. Plant pathology.**—*Rep. Brooklyn bot. Gdn, 1938* (*Brooklyn bot. Gdn Rec.*, xxviii, 2), pp. 47–51, 1939.

In further studies on the inheritance of resistance of oat hybrids to loose and covered smuts [*Ustilago avenae* and *U. kolleri*, respectively: *R.A.M.*, xvii, p. 451] the hybrid of Green Mountain × Monarch was used. Both parents are susceptible to the Missouri race of *U. kolleri*, while one,

Monarch, is resistant to the Missouri race of *U. avenae*. All the F_2 plants were susceptible to the former whereas only 25 per cent were infected by the latter and by a new physiologic race of *U. kolleri* to which Monarch is susceptible.

In further infection studies by L. G. Utter with 13 new races resulting from hybridization between loose and covered smuts of oats [ibid., xvii, p. 15], the covered smut types gave up to 100 per cent. infection on Gothland and other varieties. Monarch was fully resistant to all races except one, which gave 40 per cent. infection. From 63 to 100 per cent. infection was obtained on Monarch with the loose smut types, Gothland was fully resistant to three of them, and both Monarch and Gothland became 100 per cent. infected by one race. As Gothland is normally resistant to covered smut but susceptible to loose smut, while the reverse obtains with Monarch, the new races selected show distinctive recombinations for symptoms, morphology, and pathogenicity.

In further work by D. Elizabeth Marcy on the effect of conditions of seedling germination on sorghum infection by covered kernel smut [*Sphacelotheca sorghi*: ibid., xvi, p. 666], using the very susceptible Dakota Amber Sorgo variety, it was found that seedlings germinated in fine sand at 17·5° and 22·5° C. showed a higher percentage of infection than others germinated in coarse sand in 12 out of 14 different combinations of seedling environmental conditions. When the germination temperature was maintained at 27·5° the percentages of infection were lower in fine sand with one exception. With the semi-resistant variety Feterita a slightly higher percentage of infection was generally obtained in fine than in coarse sand.

Stevens (N. E.) & Haenseler (C. M.). **Fifth experimental forecast of the incidence of bacterial wilt of Sweet Corn.**—*Plant Dis. Reptr*, xxiii, 6, pp. 99–104, 1 graph, 1 map, 1939. [Mimeographed.]

A survey of the incidence of bacterial wilt of maize (*Aplanobacter stewarti*) in the United States in 1938 illustrated the general reliability of the method of predicting outbreaks of the disease in a given season on the basis of the preceding winter temperatures [*R.A.M.*, xvii, p. 105], though deviations from the expected developments in certain regions suggest the operation of additional controlling factors requiring further study. The winter of 1938–9 was slightly warmer than that of 1937–8 and somewhat colder than 1936–7, suggesting the probability of commercially significant losses during the summer of 1939 as far north as Rockland County, New York, and Indianapolis, Indiana. In fact, the cumulative deleterious effect on the crop of three mild winters may well result in heavier damage than that sustained in the two previous years.

Cornoldi (G.). **Ingiallimento ed afidi nelle giovani piante di Sorgo zuccherino.** [Yellowing and aphids on young plants of saccharine Sorghum.]—*Industr. saccar. ital.*, xxxii, 3, pp. 145–147, 1939.

A planting of saccharine sorghum [*Sorghum* (?) *bicolor*] at Bottrighe, Italy, became infected in 1938 by a chlorotic disease, to which succeeded severe aphid infestation, especially of the yellow leaves. The normal green foliage of plants in various stages of development was found by analysis to contain 0·5, 0·36, 0·21, and 0·135 per cent. hydrocyanic acid,

the corresponding figures for the chlorotic leaves being 0·045, 0·032, 0·026, and 0·014. Observations on the reaction to the disease of 52 varieties showed 50 to 100 per cent. infection in 28, 10 to 45 per cent. in 19, and 5 per cent. in 5 (Atlas, Gooseneck, Iceberg, Ambrosia, and Gooseneck Rosso).

Mourashkinsky (K. E.). Новый пиреномицет на Просе. [A new Pyrenomycete on Millet.]—*Trans. Omsk Inst. Agric.*, xvi, 1 fig., pp. 103–104, 1938. [Received July, 1939.]

An account [with a Latin diagnosis] is given of *Melanomma panici miliacei* n.sp., found in 1934 on the grain of millet [*Panicum miliaceum*] in West Siberia. Infected seeds failed to germinate and quickly became covered with an abundant white mycelium, later turning a pinkish violet. The fungus has black, carbonaceous perithecia, 450 to 520 by 400 to 430η, asci 120 to 140 by 12 to 15μ and dark brown ascospores, oblong, ellipsoid, sometimes slightly curved, triseptate, contracted at the septa, 32 by 6·2 (30 to 34 by 5·5 to 7)μ. Its pathogenicity was proved by inoculation experiments. The fungus appeared to be a weak parasite, causing debility and die-back of weak millet plants but having no noticeable effect upon vigorous ones. Perithecia were produced on sterilized ears of wheat.

Van der Plank (J. E.) & Rattray (J. M.). **Two new disinfectants for Citrus.**—*Citrus Grower, 1939*, 65, pp. 13–14, 1939. [Abs. in *Chem. Abstr.*, xxxiii, 12, p. 4731, 1939.]

Sodium *o*-phenyl phenate at concentrations of 0·3 to 0·5 per cent. and weak solutions of sodium *o*-phenyl phenol were found [in South Africa] to be effective as citrus fruit dips for green mould [*Penicillium digitatum*] control. Neither solution injures the fruit. The alkalinity of the sodium *o*-phenyl phenate solution requires constant watching, which is not necessary for the sodium *o*-phenyl phenol treatment, the success of the latter depending on the temperature of the dip and the period of immersion of the fruit. The use of sodium *o*-phenyl phenate as a general packhouse disinfectant against *P. digitatum* is regarded as a very promising line of control.

Carvajal B[arahona] (F.). **'Ojo de gallo' (Omphalia flavida).** [Cock's eye (*Omphalia flavida*).]—*Rev. Inst. Def. Café Costa Rica, Suppl.* vii, 52, 40 pp., 12 figs., 1939.

In the course of a full account of the coffee leaf spot caused by *Omphalia flavida* [*R.A.M.*, xvii, p. 314] in Costa Rica, where the disease is stated to be very prevalent, with periods of special recrudescence of severity at intervals of about 14 years, the author states that in 1938 he collected in the San José province abundant naturally infected material bearing fructifications of both the imperfect and perfect stages of the fungus, in some cases in association on the same leaves or berries. The sporophores fully agreed with the description of Maublanc and Rangel [whose Latin diagnosis is reproduced]. The development of the perfect stage in nature is considered to have been stimulated by the high humidity, dense shade provided by the cover plants, and proximity

to running water in the plantations in which it was found. Observations indicate that *O. flavida* may attack any green plant growing close enough to the soil to ensure sufficient humidity, and a list is given of over 100 host plants, belonging to more than 50 families, on which it has been so far actually found. While a fully effective means of controlling the disease is not yet known, the damage may be minimized by strict sanitation of the plantations, wider spacing of the coffee bushes, ensuring better circulation of air, and generally all measures directed towards reducing the humidity of the environment, and increasing the vigour of the coffee, such as adequate dressings of stable and artificial manures. Periodical spraying of the plantations with Bordeaux mixture (5 lb.–6 lb.–200 l. plus 4 lb. yellow soap), is also recommended.

Rogers (C. H.). **The relation of moisture and temperature to growth of the Cotton root rot fungus.**—*J. agric. Res.*, lviii, 9, pp. 701–709, 2 figs., 1939.

Details are given of controlled experiments in Texas, in which *Phymatotrichum omnivorum* [*R.A.M.*, xviii, pp. 106, 175] was grown in Houston black clay soil with a soil moisture content varying from 15 to 35 per cent., oven-dry basis. The optimum content for growth was about 25 per cent., equivalent to 35 per cent. of the maximum water-holding capacity of the soil. The fungus produced sclerotia at soil moistures from 15 to 30 per cent., but neither sclerotia nor mycelial strands developed at or below 8 or above 35 per cent. In constant temperature baths both the mycelial strands and sclerotia were formed at temperatures between 11° and 37° C., the optimum for both being approximately 27°. Though there was no active growth at 3°, the lowest temperature tested, the fungus was not apparently injured; it was killed at 39° or above. At the lower temperatures the sclerotia and mycelial strands were of a whitish-amber colour, which was retained by both formations throughout the experiment at the minimum temperature permitting growth; at higher temperatures both were formed with the usual dark colour of maturity as found in the field. These results are held to indicate that soil moisture is the limiting factor for the growth and spread of *P. omnivorum* in the field during the vegetative period.

Rea (H. E.). **The control of Cotton root rot in the Blackland region of Texas.**—*Bull. Tex. agric. Exp. Sta.* 573, 36 pp., 1939.

In the so-called 'blackland' region of Texas, cotton root rot due to *Phymatotrichum omnivorum* [see preceding abstract] is very destructive, all conditions being favourable to the fungus. The spread of the disease into a previously uninfected part of a cotton field may be arrested by a barrier of sorghum at least 30 ft. wide. Under local conditions the most suitable and highly effective control is given by rotation with non-susceptible crops, the cotton being grown during only one-quarter of the period of rotation. The period between the cotton crops must be at least two years. The control of susceptible weeds is a prerequisite to control by rotation. The cotton yields obtained in rotated areas are higher than in others. At Temple, the less often cotton was planted the greater were the increased yields, and the more effective the control.

TIMONIN (M. I.). **Pathogenicity of Beauveria bassiana (Bals.) Vuill. on Colorado Potato Beetle larvae.**—*Canad. J. Res.*, Sect. D, xvii, 4, pp. 103–107, 1 fig., 1939.

Beauveria bassiana [*R.A.M.*, xviii, p. 521] was isolated in New Brunswick from dead larvae of the Colorado potato beetle (*Leptinotarsa decemlineata*) and its pathogenicity proved by inoculations. Some of the infected larvae successfully passed into the pupal stage but perished a few days later. Although some evidence indicated that the fungus does not attack the eggs, infected young larvae were found dying on the fourth day after hatching from eggs dusted with the conidia of the fungus, and it would appear, therefore, that the larvae of *L. decemlineata* are susceptible to the fungus at any stage of their development.

URBAIN (A.) & GUILLOT (G.). **Les aspergilloses aviaires.** [Avian aspergilloses.]—*Rev. Path. comp.*, xxxviii, 503, pp. 929–955, 1938. [Abs. in *Bull. Inst. Pasteur*, xxxvii, 10, pp. 609–610, 1939.]

This work is described by J. Magrou as an excellent survey of avian aspergilloses. Following a historical outline of the subject, the authors successively discuss the botanical characters of *Aspergillus* and the symptomatology, pathological anatomy, diagnosis, etiology, and pathogenesis of the diseases of birds caused by fungi of the genus. In conclusion some observations are made on immunization, prophylaxis, therapy, and transmission to man, and an eight-page bibliography is appended.

BØE (J.), HARTMANN (O.), & THJØTTA (T.). **A serological study of Aspergillus fumigatus.**—*Acta path. microbiol. scand.*, xvi, 2, pp. 178–186, 1939.

Ten strains of *Aspergillus fumigatus*, isolated from the lungs of grouse [cf. *R.A.M.*, xviii, p. 109] killed by the fungus in Norway, were grown in pure culture on tomato juice agar and found to be highly pathogenic to rabbits and guinea-pigs. Rabbits treated with large quantities of antigen (7,400,000,000 spores or 100 mg. mycelium per animal) yielded sera rich in complement-fixing antibodies. Titres up to a dilution of 1 : 1,600 were registered. No serological differences between the several strains of the fungus were apparent.

TIFFNEY (W. N.). **The host range of Saprolegnia parasitica.**—*Mycologia*, xxxi, 3, pp. 310–321, 1 graph, 1939.

The results of controlled inoculation experiments showed that *Saprolegnia parasitica* [*R.A.M.*, xvii, p. 319] was capable of attacking a wide range of hosts, including fish of nine different families, frogs, and salamanders, 17 new species being added to previous records. The resistance to the pathogen varied considerably in various species, and injury was found to lower the resistance in the majority of the hosts. The disease produced identical symptoms in the various fish tested. Fish were frequently observed to eat living mycelial mats of *S. parasitica* without developing intestinal mycosis. With one exception there was no evidence that the death of the host was caused by smothering. It is suggested that death may possibly be occasioned through the

destruction of tissue, the formation of toxic materials, and the dilution or dehydration of body fluids resulting from the destruction of areas of protective epidermis.

Decker (J. J.). **Pulmonary moniliasis.**—*New Engl. J. Med.*, ccxx, 15, pp. 626–628, 3 figs., 1939.

Clinical details are given of a case of pulmonary moniliasis in a 57-year-old farm labourer, the causal organism isolated from whose sputum was identified by D. S. Martin as *Monilia* [*Candida*] *albicans* [*R.A.M.*, xviii, pp. 395, 525, 526]. The case falls into the acute category of the disease in respect of its sudden onset and rapid progression, but is believed to be unique in this group by reason of its comparatively rapid termination in complete recovery.

Langeron (M.) & Guerra (P.). **Remarques sur le Candida stellatoidea (Jones et Martin 1938).** [Notes on *Candida stellatoidea* (Jones & Martin 1938).]—*Ann. Parasit. hum. comp.*, xvii, 3, pp. 257–260, 1 pl., 1939.

A strain of *Candida stellatoidea* [*R.A.M.*, xvi, p. 811] received by the authors from Norway, where it had been isolated from the sputum of a patient suffering from pulmonary disease, was found to possess many of the biological characters of *C. albicans* [see preceding abstract], but to differ significantly in others. Moreover, the giant colonies did not resemble those typical of *C. albicans*, being covered with deep, regular folds radiating out from a small, central, folded zone.

It is concluded that the *C. albicans* group includes three species, viz., *C. albicans* (C. Robin, 1845), *C. triadis* (Langeron & Talice, 1932), and *C. stellatoidea* (Jones & Martin, 1938).

Longmire (W. P.) & Goodwin (C. P.). **Generalized Torula infection. Case report and review with observations on pathogenesis.**—*Johns Hopk. Hosp. Bull.*, lxiv, 1, pp. 22–40, 2 pl., 1939.

This is a very detailed account of a case of generalized *Torula* or *Cryptococcus* infection (*T. histolytica*) [*Debaryomyces neoformans*: *R.A.M.*, xviii, p. 456], involving the brain, meninges, internal organs, thyroid, and aorta, in a four-year-old coloured girl at the Provident Hospital, Baltimore. The identity of the fungus isolated in pure culture on Sabouraud's medium was established by the following features: (1) absence of gas formation in any of the five sugars inoculated, (2) weak acid formation in two (dextrose and sucrose), (3) characteristic morphology, (4) reproduction exclusively by budding, (5) no mycelium or spore formation, and (6) typical pathological changes in experimental animals inoculated subcutaneously and intraperitoneally with a heavy saline suspension of a 36-hour culture.

The size of the round, double-contoured yeasts varied from 1 or 2 to 10 to 15μ. Generally speaking, the smaller forms with wide capsules predominate in favourable environments in the test-tube, in experimental animals, and in human lesions, while the larger ones are characteristic of relatively unfavourable conditions in the culture media and in human and animal lesions in which prominent tubercle formation is induced by vigorous defence reaction. The 'fur-like' appearance of

the cells observed by Stoddart and Cutler (*Monogr. Rockefeller Inst. med. Res.* 6, 1916) in the lesions in laboratory animals was demonstrated by W. G. MacCallum in the brain and meninges of the authors' case.

Habibi. **Étude de trois cas de Rhinosporidium seeberi en Iran.** [Study of three cases of *Rhinosporidium seeberi* in Iran.]—*Ann. Parasit. hum. comp.*, xvii, 2, pp. 103–107, 2 pl., 1939.

The presence, hitherto unknown, of *Rhinosporidium seeberi* [*R.A.M.*, xviii, p. 455] in Iran was established by the occurrence in Teheran in 1937 of two native cases, a brief clinical history of which is given, together with that of a third case from Azerbaidjan (U.S.S.R.). Contrary to S. E. Parodi, the author found that at a certain stage in their development the sporangia of the fungus are always provided with a pore, some 10μ wide, surrounded by a ring of thickened wall, through which the spores escape in small numbers; at a later stage, however, the sporangia burst wide open, owing to internal pressure.

Cochet (Mlle G.). **Sur un nouveau champignon arthrospore (Arthrographis langeroni n.g., n.sp.), agent pathogène d'une onychomycose humaine.** [A new arthrosporous fungus (*Arthrographis langeroni* n.g., n.sp.), the pathogenic agent of human onychomycosis.]—*Ann. Parasit. hum. comp.*, xvii, 2, pp. 97–102, 2 pl., 1939.

Isolations from a case in 1938 of human onychomycosis at Lille, France, yielded a fungus which in cultures on various media formed an abundant mycelium of long, slender hyphae which readily broke up into long arthrospores of the same diameter (1·6μ); there were also present in the cultures long, irregular rows of thicker, ovoid arthrospores which appeared to germinate *in situ*, forming agglomerations of spores of varying shape and size. The main distinctive feature of the fungus is considered to be the formation at the end of the long and slender hyphae of tufts of regular, squarely cut arthrospores, somewhat similar to those in the genus *Penicillium*. In consideration of these tufts the author suggests the creation for the fungus of a new arthrosporous genus *Arthrographis* and names the organism *A. langeroni* [without technical descriptions or Latin diagnoses]. Experimentally the fungus was shown to cause a mild, transient dermatomycosis in guinea-pigs and rabbits.

Castello (V. P.). **Keratomycosis nigricans palmaris.**—*Rev. argent. Dermatosifilol.*, xxii, pp. 255–264, 1938. [? Spanish. Abs. in *Bull. Inst. Pasteur*, xxxvii, 10, p. 607, 1939.]

From a discoloured, dull, slightly rugose, hyperkeratinous lesion on the palm of the right hand of a 14-year-old white Cuban girl the writer isolated on Sabouraud's agar a fungus characterized by black, greenish-bordered colonies, becoming covered with a pale green 'duvet' composed of a septate mycelium, blastospores grouped in botryose formation, and septate arthrospores. It is referred to *Cladosporium wernecki* [*R.A.M.*, xv, p. 20]. Inoculation experiments on animals gave positive results.

McMaster (P. E.) & Gilfillan (C.). **Coccidioidal osteomyelitis.**—*J. Amer. med. Ass.*, cxii, 13, pp. 1233–1237, 7 figs., 1939.

Based on a perusal of the relevant literature and personal observa-

tions in 24 Californian cases (average age 32, 13 fatal), the writers give an account of the bone and joint involvement, roentgenographic features, pathological and histopathological changes, and therapy of coccidioidal osteomyelitis due to *Coccidioides immitis* [*R.A.M.*, xviii, p. 527].

Storts (B. P.). **Coccidioidal granuloma simulating brain tumor in a child of four years.**—*J. Amer. med. Ass.*, cxii, 14, pp. 1334–1335, 3 figs., 1939.

Clinical details are given of a fatal case of coccidioidal granuloma (*Coccidioides immitis*) [see preceding abstract] simulating brain tumour in a four-year-old girl at Tucson, Arizona, this being the first report of the disease from that locality.

Greco (N. V.), Bigatti (A.), Ponce de Léon (S.), Gunche (F. F.), & Capurro (J.). **Un segundo caso familiar de enfermedad (sarcomatosis) de Kaposi, con el hongo patógeno especifico, el Cryptococcus haematicon.** [A second family case of Kaposi's disease (sarcomatosis), with the specific pathogenic fungus, *Cryptococcus haematicon*.]—*Sem. méd., B. Aires*, xlv, 44, pp. 989–1000, 17 figs., 1938. [French summary.]

A case is described of Kaposi's disease (sarcomatosis) in a 39-year-old man in Buenos Aires, the second in his family to contract the malady, which subsequently spread to other members. The causal organism isolated from the blood on a special medium was identified as *Cryptococcus haematicon* Greco, already described in 1936. The average diameter of the monocellular elements is 0·2 to 2μ, but longer ones (3 to 8μ) were also observed. Reproduction is effected by budding (blastospores), division (arthrospores), and nuclear fragmentation (endospores).

Greco (N. V.), Bigatti (A.), Ponce de Léon (S.), & Capurro (J.). **Etiología de la enfermedad de Schamberg observada en un caso.** [The etiology of Schamberg's disease observed in a case.]—*Sem. méd., B. Aires*, xlv, 50, pp. 1345–1360, 15 figs., 1938. [French summary.]

A detailed account is given of a case of Schamberg's disease in a 40-year-old man in Buenos Aires, Argentina, where only about ten persons have been treated for the malady since 1931. The pathogenic elements in the blood measure 0·5 to 7μ in diameter; reproduction is effected by budding (blastospores) and division (arthrospores). The central nucleus, 0·2 to 0·4μ, divides and gives rise to endospores. The causal organism is named *Cryptococcus haemotophilus* Greco [without a Latin diagnosis]; it is considered to be definitely implicated in the etiology of the mycotic septicaemia associated with Schamberg's disease.

Maplestone (P. A.) & Dey (N. C.). **A Microsporum new to India.**—*Indian med. Gaz.*, lxxiv, 3, pp. 148–151, 1 col. pl., 3 figs., 1939.

A species of *Microsporon* hitherto unknown in India was isolated from seven cases of ringworm of the scalp, six in a girls' school at Shillong and the seventh in a Calcutta boy who had visited the infected

area. The fungus conforms in general characters to *M. ferrugineum* [*R.A.M.*, xviii, p. 523], of which it may possibly be a variant. On various standard media the colour of the cultures ranges through different shades of brown, whereas deep yellow is typical of *M. ferrugineum* proper.

RABELLO. **Sporotrichosis fungoides: eine neue klinische Form mit Kultur von Sporotrichum (Dematium) gougeroti.** [Sporotrichosis fungoides: a new clinical type with culture of *Sporotrichum* (*Dematium*) *gougeroti*.]—*Ann. bras. Derm. Syph.*, xiii, pp. 143–145, 1938. [Portuguese, with French summary. Abs. in *Zbl. Haut- u. GeschlKr.*, lxii, 6–7, p. 365, 1939.]

From unusual manifestations of sporotrichosis in the shape of hemispherical, hard nodules on the dorsal surface of the hand, forearm, and clavicular region the writer isolated *Sporotrichum gougeroti* [*R.A.M.*, xv, p. 293] in pure culture at the Rio de Janeiro University, Brazil.

ADAMS (J.) & PARFITT (E. H.). **Some factors influencing the amount of mold mycelia in butter.**—*J. Dairy Sci.*, xxii, 5, pp. 367–374, 1939.

Mould (*Oospora lactis*, *Penicillium*, *Aspergillus*, and *Mucor*) mycelium fragments in butter [*R.A.M.*, xvii, p. 680] were shown by the authors' studies at Purdue University, Lafayette, Indiana to be an index of the duration of holding, storage temperature, and oxygen relationship of the cream from which the product was made, but not a direct index of organoleptic quality of the cream. An average cream held at or below 70° F. for six days produced a butter positive for mould mycelia in less than 40 per cent. of the fields examined, whereas a sample kept for four days at 80° yielded a product with 80 per cent. of the fields positive. There was no significant difference in the grading, in respect of moulds of the butter obtained from cream held for six and twelve days with limited and unlimited air supplies. The milk fat content of the cream exerted a slight influence on mycelial development, which was lower in nine out of ten tests in samples made from cream testing 45 per cent. than in those from cream with a 15 per cent. milk fat content. In general, the percentage of mould mycelium retention in butter ranged from 20 to 30. None of the manufacturing operations investigated significantly influenced the mould mycelium content of the butter.

GARASSINI (L. [A.]). **Ubicación generica del micromicete que produce el 'pasmo' del Lino.** [Generic position of the fungus producing 'spasm' of Flax.]—*Rev. Fac. Agron., La Plata*, Ser. 3, xxiii, pp. 95–107, 6 figs., 2 graphs, 1938. [French and German summaries. Received July, 1939.]

The spores of the agent of flax 'spasm' in the Argentine, referred by Spegazzini to *Phlyctaena* (?) *linicola* (= *Septoria linicola* (Speg.) Garassini) [*R.A.M.*, xv, p. 441; and regarded by Wollenweber as the pycnidial stage of *Sphaerella linorum*: ibid., xviii, p. 112], are definitely known from the relevant literature and the author's numerous microscopic observations to be septate, a characteristic feature of *Septoria*. Comparative biometric calculations showed the ostiolar dimensions of the flax pathogen, *S. petroselini* var. *apii* [*S. apii*] from celery, *S. tritici* from wheat, and *S. gladioli* from gladiolus (mean of 100) to be

32·10, 31·7, 43·7, and 21·25 μ, respectively: these data are considered to furnish further evidence of the identity of *P. linicola* as a *Septoria*.

NEERGAARD (P.). **Nye eller upaaagtede Prydplantesygdomme i Danmark.** [New or unobserved diseases of ornamental plants in Denmark.]—Reprinted from *Gartnertidende, 1938*, 34, 6 pp., 9 figs., 1938. [Received June, 1939.]

Some of the information in this account of eight fungal diseases of ornamental plants new to, or hitherto unobserved in, Denmark has already been noticed from other sources, but the following points are of interest. *Alternaria cheiranthi* [*R.A.M.*, xvi, p. 482] has been prevalent of recent years among wallflower seed stocks. The fungus causes foliar spotting and wilting and may involve the siliquae, whence infection passes to the seed. Another natural host of the organism in Denmark is stock [*Matthiola incana*]. In tests in which sterilized wallflower seeds were grown in soil inoculated with pure cultures of *A. cheiranthi* the percentage of healthy germinating seedlings was reduced from 60·9 to 39·4, the corresponding figure for infection with *Ascochyta cheiranthi* [see above, p. 572] being 42·8. In seed disinfection the best results were given by half-an-hour or an hour's immersion in 0·25 per cent. uspulun, which increased the percentage of germination from 58·3 to 84 per cent., though causing some damage (11 per cent.) to the emerging shoots. The germination and injury percentages for germisan and formalin at the same strength were 81·5 and 8, and 80 and 11·5, respectively.

Ascochyta cheiranthi caused extensive defoliation and produced bluish-grey lesions on wallflower stems in a Copenhagen nursery. In inoculation experiments with pure cultures of the fungus wounded one-month-old plants kept under bell-jars at a relative humidity of 90 to 95 per cent. succumbed more rapidly than those left uncovered (70 to 80 per cent.). The maintenance of relatively dry conditions is therefore an important means of combating infection by *A. cheiranthi*, which probably originates, however, in the seed and should be controlled as recommended above for *Alternaria cheiranthi*.

An undetermined species of *Alternaria* was responsible for heavy losses (estimated at Kr. 1,000 by one grower alone) in *Godetia hybrida*, which developed a dry rot of the stems, followed by wilting and shedding of the leaves. Under humid conditions the diseased organs became covered with a dense, dark green, later sooty, fungal coating. The Sybil Sherwood and Kelvedon Glory varieties were particularly susceptible. Good control was effected by half-an-hour's immersion of the seed in 0·25 per cent. uspulun. Plants to which calcium nitrate was applied early in April contracted infection sooner than those not manured till about 10th May.

LACEY (MARGARET S.). **Studies in bacteriosis. XXIV. Studies on a bacterium associated with leafy galls, fasciations and 'cauliflower' disease of various plants. Part III. Further isolations, inoculation experiments and cultural studies.**—*Ann. appl. Biol.*, xxvi, 2, pp. 262–278, 2 pl., 1939.

The organism causing fasciation of sweet peas [cf. *R.A.M.*, xviii,

p. 317] is referred to in this paper as *Bacterium fascians* [n. comb.], following the rejection of the generic name *Phytomonas* for plant-pathogenic bacteria [ibid., xvii, p. 302]. The author succeeded in isolating this bacterium from plants of 25 different genera belonging to 16 families (both mono- and dicotyledons), genera, species, and even varieties of one family showing considerable differences in susceptibility. Most of these strains, but not all, produced severe fasciation upon inoculation into sweet pea seedlings, and characteristic galls in chrysanthemums, carnations, *Schizanthus retusus*, *Nicotiana glutinosa*, *N. tabacum*, *Heuchera sanguinea*, *Petunia*, *Asparagus sprengeri*, peas, beans (*Phaseolus vulgaris*), and broad beans (*Vicia faba*). Inoculations of tomato, gladiolus, and potato gave negative results. Physiological studies failed to demonstrate any cultural differences between the virulent and avirulent strains. Although there was some variation in pathogenicity among the strains, it was not possible from the data to determine any biological distinction. In both naturally and artificially infected plants the galls are invariably produced by the stimulation and abnormal proliferation of bud tissue. Attempts to produce abnormal proliferation of other tissues failed. The bacteria are mainly confined to the exterior of the growths, a thick zoogloea being sometimes found pressed against the outer walls of the epidermis, occasionally penetrating into the intercellular spaces and forming pockets of necrosed tissue. Seeds of *S. retusus* from an infected nursery, when embedded in agar, produced a mixed bacterial growth containing *Bact. fascians*, indicating that the bacterium may be seed-borne.

In further physiological tests the various strains of *Bact. fascians* were separated into two main groups—those producing acid from lactose and those failing to do so, the latter being again separated into those producing a small quantity of acid from mannitol and those causing no increase in the hydrogen-ion concentration of mannitol media. All the strains produced more or less acid from glucose, and saccharose, and coloured litmus milk deep blue, while most of them feebly reduced nitrates when grown on synthetic nitrate agar, but not on fluid synthetic nitrate or peptone media. Liquefaction of gelatine took place on the surface of a stab culture of *Bact. fascians* incubated at 24° C. after two to four weeks.

Brooks (F. T.) & el Alaily (Y. A. S.). **A canker and die-back of Roses caused by Griphosphaeria corticola.**—*Ann. appl. Biol.*, xxvi, 2, pp. 213–226, 2 p., 1939.

A fungus, identified in single spore culture as *Griphosphaeria corticola* (Fckl) v. Höhn, was isolated at Cambridge from dead stems and cankers of various roses. The disease is confined to the stems and appears either as a canker or a die-back. The cankers, which have a smooth and purplish margin, develop as brown depressions in the bark, frequently around some kind of injury, such as pruning wounds, dead buds, leaf scars, wounds made by thorns, and rust lesions, and attain a length varying from half-an-inch to several inches. They either completely girdle the stem or spread downwards, causing die-back in either case. Numerous small, blackish fructifications develop as the bark dies. The optimal temperature for the growth of spores in Dox's medium or on

rose stems was 20° C., while little growth occurred at 5° or 30°, temperatures above 20° favouring, on the other hand, the growth of the aerial mycelium. The conidial fructifications were either acervuli or ill-defined pycnidia and developed before the perithecia. Conidial isolations varied slightly as regards size and shape of spores, cultural behaviour, and relative pathogenicity, but are all referred provisionally to *Coryneum microstictum* [*R.A.M.*, xvii, p. 797]. Perithecia with three-septate, hyaline ascospores were produced after three months in culture, and on rose stems in the field following inoculation with 3 out of 11 isolations. Both the conidia and the ascospores germinated readily, each cell forming a germ-tube, the ascospores occasionally germinating inside the ascus and causing the ascus wall to break down. In inoculation experiments with both ascospores and conidia all the isolations tested proved pathogenic to 16 varieties of roses, Duchess of Atholl, Lady Inchiquin, and Golden Emblem being the most susceptible and Independence Day, Mrs. G. A. Van Rossen, and Madame Edouard Herriot the most resistant. Inoculations were successful at all times except summer, when the invasion of the fungus was stopped by the rapid formation of a gum barrier. The disease may cause considerable damage if allowed to spread without check. With some varieties normal pruning is considered a sufficient means of control, and cutting out and burning of diseased shoots is recommended.

Massey (L. M.). **Fungicides for Roses.**—*Amer. Rose Annu.*, *1939*, pp. 103–111, 1939.

Further tests in 1938 at Cornell University in the control of black spot and mildew of roses (*Diplocarpon rosae* and *Sphaerotheca pannosa*) demonstrated the general superiority of sulphur over copper fungicides. The wettable sulphurs included magnetic, flotation dry (thylox type), and mike [*R.A.M.*, xvii, pp. 256, 722] (4 oz. in 5 gals. water). Effective control was also given by sulphur dust (325 mesh or finer), lime-sulphur (1 in 80), and liver of sulphur (1 oz. in 3 gals.); the soluble sulphurs, however, are more liable than the wettable to injure the bushes. The best of the copper mixtures was 1–$\frac{1}{2}$–50 Bordeaux. Under Ithaca conditions severe injury was caused by cuprocide 54, red copper oxide, basic copper sulphate, and copper zeolite, while similar objections apply to the otherwise reasonably satisfactory palustrex sulfonate B and triogen [ibid., xvii, p. 683]. Alphasol OT and OS, Grasselli spreader-sticker, areskap [ibid., xviii, p. 440], bindarene flour, and sodium abietate were effective as spreaders.

Gregory (P. H.). **The life history of Ramularia vallisumbrosae Cav. on Narcissus.**—*Trans. Brit. mycol. Soc.*, xxiii, 1, pp. 24–54. 1 pl., 33 figs., 1939.

In an account of the life-history of *Ramularia vallisumbrosae* [*R.A.M.*, xvii, p. 42], which he considers to be synonymous with *R. narcissi* and probably also with *Cercosporella narcissi*, the author states that the fungus aestivates by means of sclerotia produced in the epidermal cells of narcissus leaves; in the south-west of England the sclerotia present in old, decaying leaves produce conidia (normally hyaline scolecospores, but phragmospores and amerospores also occur) in January and

February, which serve to infect the new leaves as they appear. On the latter similar conidia are formed from subcuticular sporodochia. The results of cultural studies and inoculation experiments showed that the various forms of conidia from the sporodochia and from the sclerotia all belong to the life-cycle of *R. vallisumbrosae*. Although the fungus by its morphological characters might be classified either as a *Cercosporella* or a *Ramularia*, preference for the present is given to the original name. The sclerotia are considered to be developed from primordia of an as yet undiscovered perithecial stage of the *Mycosphaerella* type; some of their morphological features do not appear to have been previously described for any fungus, such as, for instance, the differentiation of the sclerotium into a sterile fat-storing 'body' and a sporogenous 'neck', in a depression of which the conidiophores originate.

Wenzl (H.). **Die Anfälligkeit der Iris-Arten gegen den Blattdürre-Pilz.** [The susceptibility of Iris species to the leaf spot fungus.]—*Blumen- u. PflBau ver. Gartenwelt*, xliii, 21, p. 246, 1939.

In a large nursery in the Lower Danube valley, Ostmark, where irises were severely attacked by *Heterosporium gracile* [*Didymellina macrospora*: *R.A.M.*, xvii, p. 750] in the summer of 1938, the writer made the following observations on varietal reaction to the leaf spot disease. Not only *Iris germanica* (of which all 30 varieties were infected) but *I. pumila* and the hybrid *I. interregna* (*I. germanica* × *I. pumila*) —Helge, Halfdan, and Valhalla varieties—proved more or less susceptible. Six varieties of *I. kaempferi*, *I. ochroleuca*, and *I. sibirica* were immune, and no spotting was observed on *I. forrestii* and *I. transsilvanica*.

Preti (G.). **Moria di piante di 'Cereus peruvianus monstruosus' per 'fusariosi' in Provincia di Imperia.** [Wilt of *Cereus peruvianus monstruosus* plants due to fusariosis in the Province of Imperia.] —*Riv. Pat. veg.*, xxix, 3–4, pp. 169–183, 6 figs., 1939.

In August, 1938, young *Cereus peruvianus monstruosus* plants in hotbeds under glass near San Remo nearly all rapidly wilted and died as a result of infection by *Fusarium oxysporum* [*R.A.M.*, xiii, p. 639], which causes a soft, black rot beginning at the top of the plants and progressing downwards. Inoculations of healthy plants gave positive results when the inoculum was inserted in small, deep wounds, but not when the surface of the wounds was large and exposed to the air. Conidial germination occurred at temperatures ranging from 21° to 30° C., but was much impaired in darkness.

Klinkowski (M.). **Beobachtungen über Krankheiten und Schädlinge iberischer Wildformen von Serradella und Lupine.** [Observations on diseases and pests of Iberian wild forms of Serradella and Lupin.]—*Z. PflKrankh.*, xlix, 5, pp. 305–321, 12 figs., 1 map, 1939.

During a tour of Spanish Morocco, south Spain, and Portugal in 1937 the writer observed severe mildew (*Erysiphe pisi*) [*E. polygoni*] infection on wild yellow lupins (*Lupinus luteus*) [*R.A.M.*, xv, p. 100]

in the vicinity of Algeciras (Spain), whereas in south Portugal, where climatic conditions similarly favourable to the disease obtain, a resistant strain of the host plant is established. Rust (*Uromyces renovatus*) [ibid., xviii, pp. 116, 549] occurred on *L. luteus*, *L. angustifolius*, *L. hirsutus*, *L. albus*, and *L. rothmaleri* in Portugal and on *L. hirsutus* and *L. angustifolius* in Spain.

Fukushi (T.). **The relation of aphids to the transmission of legume mosaics (2).**—*J. Sapporo Soc. Agric. For.*, xxx, 147, pp. 399–418, 1939. [Japanese, with English summary.]

Red clover [*Trifolium pratense*] mosaic was found to be readily transmissible by means of *Aphis laburni* to peas, broad beans [*Vicia faba*], beans [*Phaseolus vulgaris*], and crimson and alsike clovers [*T. incarnatum* and *T. hybridum*: *R.A.M.*, xvii, p. 575]. With the exception of *P. vulgaris*, on which the symptoms produced were somewhat different from those of bean mosaic, the experimental plants reacted to inoculation by the development of symptoms similar to those observed in the field. The aphids frequently acquired the virus during a feeding period of five to ten minutes on diseased red clover, and individuals carrying the virus were sometimes able to infect peas in five-minute exposures. Viruliferous aphids lost their infective capacity after feeding on healthy peas for 10 to 30 minutes, but retained it for about an hour when deprived of food after removal from diseased plants; subsequently infectivity gradually declined. *A. laburni* is present in abundance on broad beans in most districts of Honshu and multiplies profusely on clovers under cages and in the greenhouse, though these plants are not yet definitely known to serve as natural hosts of the insect. Under local conditions, therefore, primary outbreaks and the subsequent dissemination of broad bean mosaic are probably brought about largely by *A. laburni*, which appears, on the other hand, to be absent from Hokkaido, where the disease is a rarity.

Macrosiphum matsumuraeanum and *Acyrthosiphon kondoi* both occur on clovers in Hokkaido. In inoculation experiments the former transmitted red clover mosaic to its own host, white clover [*T. repens*], *T. hybridum*, and peas, while the latter conveyed the virus to peas, *P. vulgaris*, and *T. incarnatum* in a small percentage of cases.

Pending comparative physico-chemical investigations it cannot be definitely decided whether the red clover, pea, and broad bean mosaic diseases are attributable to a single virus, but the balance of available evidence is considered to point in this direction. The Japanese virus resembles a number of other legume mosaic viruses, particularly that of Osborn's pea mosaic (pea virus 2) [ibid., xvii, pp. 126, 249].

Komarova (Mme A.). О вредоносности Клеверного антракноза. [On the injuriousness of Clover anthracnose].—*Pl. Prot., Leningr.*, *1939*, 18, pp. 166–169, 1939.

The fungus *Gloeosporium caulivorum* [*Kabatiella caulivora*: *R.A.M.*, xvii, p. 441] is stated to attack overwintered two- and three-year-old clover plants more intensely than one-year-old, and cultivated varieties more than wild ones. For instance, data collected in 1929 show that none of the 106 samples of wild and 92 of cultivated clover were

attacked in the first year of growth, whereas in the second year 85·4 and 10·9 per cent. of the cultivated and 57·1 and 14·3 per cent. of the wild clover were affected slightly and moderately severely, respectively. The early ripening varieties Kieffsky, Souttonovsky 3942, and Nossovsky were less affected by the disease than the late ripening ones, and in their third year of growth showed a decrease both in the amount and degree of infection, while it increased in the late ripening varieties. The disease appears in overwintered clover in June and reaches its maximum development in August.

The destructiveness of the disease was studied in relation to the degree of infection. No plants showing no infection (O) or slight infection (I) were found, the others were divided among categories II (up to five weak spots on the stems), III (up to three sunken spots on the stems), IV (up to five sunken spots on the stems), and V (canker causing stem break). Assuming the yield and the absolute weight of seeds (1,000) in category II to be 100 in each case, the corresponding figures in III were 74 and 96; in IV, 70 and 90; and in V, 35 and 88, respectively. The disease develops more intensely in warm than in rainy years. The best results in disinfection tests were obtained with dry heat treatment of the seeds, either for six hours at 70° or four days at 60° C., which increased the germination of the seeds and reduced infection to innocuous proportions.

Neill (J. C.) & Hyde (E. O. C.). **Blind-seed disease of Rye-Grass.**—*N.Z.J. Sci. Tech.*, xx A, 5, pp. 281–301, 18 figs., 1939.

The condition of low germinability of perennial rye grass (*Lolium perenne*) seed [*R.A.M.*, xviii, p. 186], found throughout New Zealand and also in samples from England, Scotland, Wales, Ireland, Sweden, Tasmania, and Victoria, is named 'blind-seed disease' and attributed to a fungus tentatively placed in the genus *Helotium* and apparently allied to *H. herbarum*. Infected seed may resemble healthy seed in appearance, but is thin and shrunken when infected early. Fungal hyphae may be found in the endosperm and embryonic tissues but not in the aleurone layer or seed coat. Conidia are always present. After exposure to cool, moist conditions such as obtain in soil during winter, 'blind' seeds may develop small, pink, waxy, irregularly coremiform sporodochia, 0·5 to 1 mm. by 0·4 to 0·6 mm., composed of a central core of compacted conidiophores, diverging apically to form penicillate branches bearing sterigmata, 6 to 9 by 2·5μ, and continuous, smooth, hyaline, broadly elliptical microconidia, 2·3 to 2·8 by 1·8 to 2·3μ, embedded in a gelatinous matrix. Attempts to induce germination of the microconidia failed. With the first flowering of the rye grass the 'blind' seeds bear apothecia which shrivel in a few hours if exposed to direct sunshine or a dry atmosphere. The apothecia have light pinkish brown, later cinnamon brown, disks, smooth at first, cupulate, later saucer-shaped to flat, and white smooth stipes, which internally are pinkish brown. The asci are cylindrical-clavate, 70 to 80 by 4·5 to 5μ, normally 75 by 5μ, eight-spored, the apical plug not staining blue with iodine; the paraphyses are colourless, septate, filiform, without swollen apices, 1·5 to 2μ in diameter. The ascospores are uniseriate, continuous, hyaline, smooth, elliptical, with somewhat pointed ends,

7 to 8 by 3 to 4 μ, generally showing two polar refractive globules. When discharged from the apothecia the ascospores lodge upon the open florets and infect the young seed, but the precise manner in which this is done has not been determined. Once established the fungus produces great numbers of macroconidia of the *Pullularia* type [loc. cit.] which surround the ovary as a pinkish, slimy mass, filling the space between the glumes. In culture they are borne on submerged or surface hyphae, and are smooth, hyaline, cylindrical to allantoid, with hemispherical ends, 12 to 19 by 3 to 3·5 μ, normally 17 by 3·5 μ, with a thick semi-gelatinous epispore; they arise laterally on a hyphal cell or, more normally, from the apex of a sterigmatic process, 7 to 8 by 2 μ. In flask cultures the fungus produced apothecia on from 1 to 15 per cent. of the number of seeds sown, development being hastened by warmth after planting.

Typical symptoms of blind-seed disease have been produced on *Lolium perenne* by immersing the spikes in suspensions of ascospores from crushed apothecia, of macroconidia from either single ascospore cultures, pure cultures, or single-spore isolations, and in mass suspensions of the conidial slime on *Lolium* ovaries. Four other fungi belonging to the Helotiaceae were collected on or near *Lolium* plants; and one is described under the name *Lolium* fungus No. 2, but inoculations with pure cultures were unsuccessful. Isolations from 100 'blind' seeds harvested in January and cultured in March to April were successful in nearly every case, but attempts to isolate the fungus from a further 100 seeds in October yielded the fungus only twice. In certain cases the fungus was able to survive and to produce apothecia after 20 months' storage in the laboratory.

Field evidence seems to indicate that Italian rye grass (*L. multiflorum*) is almost immune from the disease, the true perennial highly susceptible, and the intermediate 'false perennial' strains intermediate in susceptibility. The apparent resistance of the Italian types may result from their late flowering, which occurs after the main discharge of ascospores. The most hopeful method of controlling the disease is believed to lie in the selection or breeding of resistant strains. There is no evidence that the disease has any deleterious effect on rye grass not used for seed production.

Kessler (W.). **Über den Einfluss von Schwefelkalkbleiarsen und anderen Pflanzenschutzmitteln auf den Chlorophyllgehalt des Apfellaubes.** [On the influence of lime-sulphur–lead arsenate and other plant protectives on the chlorophyll content of Apple foliage.] —*Gartenbauwiss.*, xiii, 2, pp. 154–168, 1 fig., 1939.

In the course of the systematic spraying experiments for the control of apple scab (*Fusicladium*) [*Venturia inaequalis*] in progress in the orchards of the Lower Elbe Valley, North Germany [*R.A.M.*, xviii, p. 531], a mixture of 2 per cent. lime-sulphur and 1 per cent. lead arsenate paste has been observed for some years past to induce a very luxuriant growth of dark green foliage, which not only attracts the woolly aphis [*Eriosoma lanigerum*] but also impairs the appearance and keeping quality of the fruit. In 1938 a similar effect was produced in large-scale tests by a stimulatory polysulphide preparation (1·5 per

cent.) submitted on trial to the Jork Experimental Station. On the other hand, Ob 72 (pomarsol) [ibid., xvii, p. 626], used throughout as a control, caused no alteration in the normal habit of foliar development.

The phenomenon was found to be due to a substantial increase (10 to 30 per cent.) in the chlorophyll content per unit of leaf mass, a similar but appreciably stronger action, resulting in a 30 to 100 per cent. rise in the chlorophyll content, being exerted by heavy applications of nitrogen (90 kg. per hect. in the form of nitrophoska) on Nathusius' Taubenapfel and Jakob Lebel. The unnamed polysulphide stimulant being entirely free from arsenic, it is evident that this element cannot be concerned in the foliar changes under discussion, which are thought more probably to be associated with the structure of the deposit.

Lopatin (M. I.). Влияние бактериального корневого рака (зобоватости) на дальнейшее развитие Вишни в плодовом саду. [Influence of bacterial root canker (crown gall) on the development of the Cherry tree in the orchard.]—*Pl. Prot., Leningr., 1939*, 18, pp. 169–173, 1939.

In field experiments with crown gall [*Bacterium tumefaciens*] on cherry, analyses of the development of Lotovka trees under conditions of drought lasting throughout the summer were made three and six months after planting. The control trees with healthy roots suffered least from the drought (16 per cent. almost or entirely perished) and showed the best new growth (average of 82·9 cm. per tree); trees with galls on lateral roots only, those with galls on root bases, and those with galls on root collars were more severely affected in this order, and those with galls on root bases and on lateral roots suffered most (60 per cent. almost or entirely perished) and showed the least new growth (average of 31·4 cm. per tree).

Elssmann (E.). **Prüfung von Sauerkirschensorten auf ihr Verhalten gegen Sclerotinia cinerea Schroet.** [Trials of sour Cherry varieties for their reaction to *Sclerotinia cinerea* Schroet.]—*Forschungsdienst*, vii, 4, pp. 361–366, 3 figs., 1939.

Of the 17 sour cherry varieties tested in 1938 at Weihenstephan (Bavaria) Horticultural Institute for their reaction to *Sclerotinia cinerea* [*S. laxa*: *R.A.M.*, xvii, p. 687; xviii, p. 508], only Montmorency Stark proved entirely immune, while a number of others, including Grosser Gobet, Diemitzer Amarelle, Ostheimer Weichsel, Drandsdorfer Saure, Hindenburg, Leitzkauer Pressauer, and Frühe Ludwig, developed gummosis but no wilting. The two types of reaction were quite distinct, severe wilting never being accompanied by gummosis or vice versa.

Huber (G. A.) & Baur (K.). **The use of calcium cyanamid for the destruction of apothecia of Sclerotinia fructicola.**—*Phytopathology*, xxix, 5, pp. 436–441, 1 fig., 1 graph, 1939.

In tests conducted in April, 1938, at the Western Washington Experiment Station, commercial pulverized and oiled calcium cyanamide, applied with a knapsack duster to the surface of the soil and vegetative cover of peas and chickweed (*Stellaria media*) under prune trees at the rate of 220 lb. per acre at the outset of apothecial produc-

tion, destroyed the existing apothecia of *Sclerotinia fructicola* [*R.A.M.*, xviii, pp. 534, 535] and prevented the development of others. Comparable results were obtained when soil in wooden boxes, in which apothecia were maturing, was treated with a surface application of the same compound at the rate of 324 lb. per acre.

Hopkins (J. C. F.). **Three important Strawberry diseases.**—*Rhod. agric. J.*, xxxvi, 4, pp. 254–259, 1 pl., 1939.

The serious deterioration of strawberry crops in Southern Rhodesia is ascribed to attacks of mildew (*Sphaerotheca humuli*) [*R.A.M.* xviii, p. 402] and two virus diseases identified in the last two years as 'yellow edge' [ibid., xviii, p. 326] and 'severe crinkle' [loc. cit.]. The degeneration of the famous Vumba variety, producing at present only small, sour, poorly flavoured fruit, is attributed chiefly to these virus diseases. Most varieties grown in the colony are stated to be susceptible to mildew. The two virus diseases are frequently found in association and are both systemic. They are widely distributed in Southern Rhodesia and are possibly spread by an aphid at present under investigation. For the control of these diseases it is recommended to plant only resistant varieties and to rogue diseased plants at the end of each season, while the application of sulphur sprays containing nicotine sulphate (40 per cent.) is advocated as a precautionary measure against the possible vector.

Nannizzi (A.). **Sullo svernamento della Cercospora cladosporioides Sacc.** [On the overwintering of *Cercospora cladosporioides* Sacc.]—*Atti Sez. agric. Accad. Fisiocr. Siena*, v, pp. 168–170, 1938. [Abs. in *Riv. Pat. veg.*, xxix, 3–4, p. 201, 1939.]

Cercospora cladosporioides [*R.A.M.*, x, p. 130] is stated to have become progressively more prevalent in olive groves in the vicinity of Siena. When the infected leaves fall in autumn, the mycelial stromata that fill the substomatal cavities thicken and extrude as small bodies resembling perithecia, on the surface of which conidia develop at the end of winter, and infect the leaves of the small sterile branches that fruited in the previous year.

[Gregory (G. B.).] **Report on the Department of Agriculture, St. Lucia, 1937.**—43 pp., 1 graph, 1939.

During 1937, 319,633 banana plants were inspected in St. Lucia, of which 7,894 (or 2·47 per cent.) were found to be infected with Panama disease [*Fusarium oxysporum cubense*] and were destroyed [cf. *R.A.M.*, xvi, p. 20]. While the percentage of infection was much higher than in 1936, when it was only 0·89 per cent., many areas hitherto regarded as abandoned and not previously examined were on this occasion brought into the survey.

Ehrke [G.]. **Regelvorrichtung für das selbsttätige Zuteilen von Beizpulver beim Röberschen Trockenbeizer. (System Dr. Stümpfig.)** [A regulating device for the automatic distribution of dust in the Röber dusting apparatus. (Dr. Stümpfig's system.)]—*Masch.- u. Geräteprüf. Reichsnährst.* (Suppl. to *Tech. in d. Landw.*), iv, 4, pp. 27–28, 1 fig., 1939.

Details are given of the construction and use of a special contrivance

for regulating the distribution of the dust in the continuous dusting apparatus supplied by Gebr. Röber, G.m.b.H., Wutha, Thüringen [cf. *R.A.M.*, xviii, p. 466]. Its treating capacity is 800 kg. of seed-grain per hour, and the cost is RM. 55.

Polyakoff (I. M.) & Petrova (Mme A. P.). Изыскание новых протравителей с целью замены формалина. [Investigation on new fungicides to replace formalin.]—*Pl. Prot., Leningr., 1939*, 18, pp. 121–129, 1939.

In laboratory tests a new liquid disinfectant called condensat, a by-product of synthetic rubber and containing 10 per cent. aldehydes (including 9·1 per cent. formaldehyde) and 4 per cent. organic acids, gave complete control of wheat bunt [*Tilletia caries*], covered smut of barley [*Ustilago hordei*], and loose smut of oats [*U. avenae*]. The new disinfectant proved to be potentially more toxic to the fungi than formalin, possibly due to the presence of other aldehydes and organic acids. In conclusion solutions of condensat 3·33 in 300 and 3·33 in 80 used in the wet and the semi-dry methods of disinfection, respectively, are recommended as effective in controlling the three diseases without reducing the germination of the seed-grain.

Andrén (F.). **Kontroll av bekämpningsmedel mot parasitsvampar.** [The testing of disinfectants against parasitic fungi.]—*Nord. JordbrForskn.*, 1938, 4–7, pp. 475–481, 1938.

Details are given of the methods employed in Sweden in the official testing of plant protectives in their various forms, e.g., as steeping solutions for cereal seed-grain and as sprays or dusts for the control of potato blight [*Phytophthora infestans*] and apple scab [*Venturia inaequalis*]. In the case of the last-named, the tests usually involve two or three varieties in the same number of orchards, five trees of each variety being treated with each of the different preparations. The potato plots are treated two or three times in three to five replications, using 2 per cent. Bordeaux mixture as a control.

Doerr (R.) & Hallauer (C.). **Handbuch der Virusforschung. Erste Hälfte.** [A handbook of virus research. First half.]—xii+546 pp., 35 figs. (10 col.), 23 diags., 13 graphs, Vienna, J. Springer, 1938. RM. 66 (bound RM. 69). Foreign: less 25 per cent. discount. [Received July, 1939.]

The first volume of this exhaustive compilation on virus diseases comprises, among others, sections on the development of virus research and the problems confronting workers in this field by R. Doerr; a useful summary of methods of determining particle size by W. S. Elford; an interesting application of the fluorescence microscope by M. Haitinger; and a summary of the biochemistry and biophysics of viruses by W. M. Stanley. Each section is followed by a comprehensive bibliography of the pertinent literature, most of the papers of phytopathological interest included in which have been noticed from time to time in this *Review*.

McFarlane (A. S.). **Chemistry of the plant viruses.**—*Biol. Rev.*, xiv, 2, pp. 223–242, 6 figs., 2 graphs, 1939.

The writer summarizes and briefly discusses some of the most outstanding recent contributions to the chemistry of the plant viruses [most of which have been noticed from time to time in this *Review*] under the headings of preparation, elementary composition, sedimentation behaviour, P_H stability, electrophoretic behaviour, anisotropy of the plant viruses, virus 'crystals' and 'gels', molecular dimensions, and some general properties.

Best (R. J.). **Virus activity as a property of some protein molecules.**—*J. Aust. Inst. agric. Sci.*, v, 2, pp. 94–102, 2 figs., 3 graphs, 1939.

This is a summary of the author's contribution to a symposium on 'The Relation between Chemical Constitution and Biological Activity' at the meeting of the Australian and New Zealand Association for the Advancement of Science, Canberra, January, 1939. The evidence for the protein nature of the mosaic group of viruses is regarded as so overwhelming that in any future discussion of the subject the onus of proof rests on those maintaining the contrary opinion. Divergences in molecular structure may be due partly to different prosthetic groups of the virus molecule and partly to different arrangements and proportions of the common constituents. The common property of self-multiplication may probably be explained by some common factor, very likely the general pattern of the protein molecule, slightly different arrangements within which would give rise to distinct virus types. With regard to the mechanism of multiplication, the molecule may be regarded as a sort of template, the electronic forces of which would attract to its surface from the environment the essential building blocks for its continuous reconstruction in the form of exactly similar elements.

[A condensed report of the paper is also given in *Aust. J. Sci.*, i, 5, pp. 159–160, 1939, which further summarizes the contributions to the symposium of B. T. Dickson, J. G. Bald, F. M. Burnet, and others (pp. 145–148).]

Bennett (C. W.). **The nomenclature of plant viruses.**—*Phytopathology*, xxix, 5, pp. 422–430, 1939.

Discussing the complex problem of the nomenclature of plant viruses, the writer raises a number of objections to the present system of numbering. The very facility of the method tends to encourage frequent changes and the arbitrary application of numbers to inadequately characterized viruses. Numbers, moreover, convey no meaning in respect of any particular feature of the viruses they purport to designate, and are therefore difficult to remember in connexion with a given disease. A further disadvantage of numbers is that they do not give sufficient scope for the organization of viruses according to different concepts of relationship; the name *Beta* virus 1, for instance, has been applied to two possibly distinct viruses, one of which may have to be renamed *Beta* virus 6, the intervening numbers having been assigned to other diseases. These and other difficulties could be solved by the

substitution for numbers of names descriptive of important properties of the virus under consideration: tobacco virus 1, for example, might be named tobacco (or *Nicotiana*) *virus altathermus*. Should subsequent investigators demonstrate the organic nature of viruses, the same virus might be known as *Paracrystalis altathermus*: if, on the other hand, they are proved to be chemical compounds, the suffix 'vir' might be adopted to signify a virus, in the same way as the termination 'ase' designates enzymes. In this case tobacco virus would become 'altathermovir'.

Holmes (F. O.). **Proposal for extension of the binomial system of nomenclature to include viruses.**—*Phytopathology*, xxix, 5, pp. 431–436, 1939.

A scheme is propounded for the extension to viruses of the binomial system of nomenclature, under which a number of well-known plant diseases would be grouped in various families of class II (Spermatophytophagi) of Division I (Phytophagi) of the virus kingdom. Thus, family 1 (Chlorogenaceae) comprises the yellow viruses; 2 (Marmoraceae) the various types of mosaic; 3 (Annulaceae) the ring spots; 4 (Gallaceae) is represented only by *Galla fijiensis*, the agent of Fiji disease [of sugar-cane]; 5 (Acrogenaceae) by potato spindle tuber; and 6 (Rugaceae) by the leaf curl group. Class I (Schizophytophagi) of Division I comprises only one family, the Phagaceae (bacteriophages). Division II (Zoophagi) embraces two families, the Arthropodophagi and the Chordatophagi.

Ainsworth (G. C.). **The nomenclature of plant viruses.**—*Chron. bot.*, v, 2–3, pp. 193–194, 1939.

The author expresses the opinion that although the practice of distinguishing viruses by numbers coupled with the names of the principal host plants has been widely accepted, it would prove very difficult to obtain international conformity to any detailed list of viruses which attempted to include all 'strains'. He considers it to be desirable that the International Committee on Description and Nomenclature of Plant Viruses should publish a list of virus types, and indicate a method (which could be applied by individual authors) for naming 'strains'. It is suggested that a convenient method of distinguishing 'strains' would be the addition in roman type to the type name in italics of either any particular designation given by the author who described the variant, or a name derived from the name of the disease, with the name of the author and the date. Thus, if the type tobacco mosaic virus was designated *Nicotiana tabacum virus* I strains could be distinguished as follows: *Nicotiana tabacum virus* I, masked strain, Holmes, 1934; *N. t. virus* I, tobacco virus 6, J. Johnson, 1927.

Yu (T. F.). **A list of plant viroses observed in China.**—*Phytopathology*, xxix, 5, pp. 459–461, 1939.

A list is given of the plant virus diseases observed in the course of phytopathological surveys made in China during the period from 1932 to 1937 [cf. *R.A.M.*, xv, p. 385]. In addition to those already reported in this *Review*, the following items may be mentioned: mosaic of lucerne,

cabbage, celery, *Primula sinensis*, clovers (*Trifolium pratense* and *T. repens*), cowpea (5 to 12 per cent.), *Dahlia* [ibid., xvii, pp. 114, 443, 684], *Datura metel*, hyacinth bean (*Dolichos lablab*), lettuce, nasturtium (*Tropaeolum majus*), peas, groundnuts, *Petunia violacea* [ibid., xviii, p. 458], vegetable marrow, radish, rape, raspberry, soy-bean (up to 100 per cent. in Shantung) [ibid., xvii, p. 655], spinach, and sweet clover (*Melilotus alba*); broad bean rosette, a hitherto undescribed disease prevalent in and near Nanking, where it may reduce the plants to tufts of small, chlorotic, curled, distorted leaves and involve losses of 5 to 50 per cent.; potato leaf roll (general in Kiangsu, 5 to 31 per cent.), spindle tuber, and witches' broom, and streak [ibid., xviii, p. 464], leaf curl, leaf roll, and rugose mosaic of tomato.

LINDQUIST (B.). **Die Fichtenmykorrhiza im Lichte der modernen Wuchsstofforschung.** [Spruce mycorrhiza in the light of modern growth substance research.]—*Bot. Notiser*, *1939*, 2, pp. 314–355, 7 figs., 4 graphs, 1939.

A fully detailed, tabulated account is given of the writer's experiments (1934 to 1937) at Lund, Sweden, on the effect of extracts from pure cultures of mycorrhiza-forming and other soil fungi on spruce seedlings grown in Erlenmeyer flasks on sand with the addition of a synthetic solution [*R.A.M.*, xviii, p. 542]. A definite stimulus to development was afforded only by the secretions of the unnamed hyaline mycelium 82 e, composed of sparsely branched, regularly septate hyphae, 3 to 4 μ in diameter, isolated from ectotrophic mycorrhiza in a spruce stand in Ångermanland; by that of *Mycelium radicis nigrostrigosum* [ibid., xv, p. 308], which tends to become parasitic on heavily shaded test plants; and by that of mycelium 19 f, isolated from spruce roots in Ångermanland and apparently distributed throughout Sweden, which acts both as a parasite and mycorrhiza-former. Mycelium 19 f is characterized on malt agar by a fairly abundant, hyaline, branched cotton wool-like mycelium, the irregularly septate hyphae of which measure 2 to 3 μ in diameter and show a marked tendency to anastomosis and oidial formation, and by a remarkable degree of resistance to cold, growth continuing at 0·5° C. (optimum P_H 5). The growth of the seedlings was retarded by the secretions of the parasitic soil fungi *M. r. atrovirens* (widespread in Scandinavian forests) [ibid., xii, p. 386], a Danish strain of *Mucor ramannianus* [ibid., xvi, p. 710; xviii, pp. 137, 232] (also prevalent in Sweden), and mycelium 17 a (from beech roots in Denmark, general throughout Scandinavia), characterized by a luxuriant, white, woolly mycelium consisting of hyaline, septate, irregularly branched hyphae, 1·5 to 3 μ, with numerous cords, coils, and clamp-connexions; the last-named fungus, in research work on symbiosis, exerted the most destructive action yet observed by the writer. Mycelium 52 c, characterized by slender, greyish-black to hyaline, profusely branched, irregularly septate hyphae, isolated from abnormal spherical mycorrhiza on beech roots in Denmark, had no effect on the seedlings, neither expediting nor delaying their growth.

The paper concludes with a critical discussion of the various theories advanced in explanation of the mycorrhizal phenomenon, including those of nitrogen and mineral salt nutrition of Frank (*Forstwiss. Zbl.*,

xvi, 1894) and Stahl (*Jb. wiss. Bot.*, xxxiv, 1900), respectively, and the growth substance interaction theory which is now being actively debated in the relevant literature.

Foster (J. W.). **The heavy metal nutrition of fungi.**—*Bot. Rev.*, v, 4, pp. 207–239, 1939.

A critical review, followed by a bibliography of 152 titles, is given of important contributions to the study of the effects on fungal growth (with special reference to *Aspergillus niger* and related Hyphomycetes) of nutrition with the heavy metals (chiefly zinc, iron, copper, and manganese) [*R.A.M.*, xvi, p. 199; xviii, pp. 240, 336].

Harter (L. L.). **Influence of light on the length of the conidia in certain species of Fusarium.**—*Amer. J. Bot.*, xxvi, 4, pp. 234–243, 1939.

With reference to the considerable difficulties which present themselves in identifying species of *Fusarium*, the author advocates the standardization of cultural methods. The special subject of this study is the influence of solar and artificial light on the length of the triseptate conidia of *F. coeruleum* [*R.A.M.*, xviii, p. 409], *F. martii* var. *pisi* [*F. solani* var. *martii* f. 2: ibid., xvi, p. 439], and *F. bulbigenum* var. *batatas* [ibid., xviii, p. 496], grown under otherwise identical conditions. The conidia reached their greatest length in cultures exposed to the maximum of available daylight, followed by those in cultures exposed to sunlight for three hours daily, while the shortest were produced in the dark, irrespective of the medium. The mean lengths of the conidia of *F. bulbigenum* var. *batatas* grown on the same medium in the light and in the dark were 38·7 and 31·6 μ, respectively, and of *F. coeruleum* 42 and 30·9 μ, respectively, these variations being much greater than the range hitherto accepted as separating certain species. A similar increase in the mean length of conidia of all three species was obtained with artificial illumination. Cultures kept in the dark during the first two days after inoculation and then irradiated differed little in spore length from cultures irradiated from the beginning; cultures kept in the dark during the first four days and then irradiated produced spores of the same length as those kept in the dark for the whole period of growth, while cultures exposed to light during the first four days and then placed in the dark produced spores of the same length as those exposed to light for the entire period of growth. The mycelial growth was more abundant in cultures kept in the dark, but sporodochia and pionnotes were more copious in the light. Macroconidia were more numerous in the light and microconidia in the dark. Statistically significant differences occurred in the conidial measurements of nine different investigators working with the same microscopical preparation.

D'Aeth (H. R. X.). **A survey of interaction between fungi.**—*Biol. Rev.*, xiv, 2, pp. 105–131, 1939.

The 'dispersed and fragmentary' literature dealing with the complex problems of fungal interaction [most of which has been noticed from time to time in this *Review*] is here assembled and concisely discussed. The bibliography comprises 175 titles.

Heintzeler (Irene). **Das Wachstum der Schimmelpilze in Abhängigkeit von den Hydraturverhältnissen unter verschiedenen Außenbedingungen.** [The growth of moulds in relation to atmospheric humidity under varying external conditions.]—*Arch. Mikrobiol.*, x, 1, pp. 92–132, 5 figs., 13 graphs, 1939.

A comprehensive survey is given of the writer's studies at the Stuttgart (Germany) Technical College to ascertain the humidity relationships of three groups of fungi, viz., (1) xerophile, with a germination limit under 80 per cent. relative humidity; (2) mesophile (between 80 and 90 per cent.); and (3) hygrophile (over 90 per cent.). Group (1) comprises *Aspergillus glaucus*, *A. niger*, and *Penicillium glaucum*; (2) *Sporodinia grandis*, *Rhizopus nigricans*, *Phycomyces nitens*, and *Ustilago avenae*; an intermediate position between (2) and (3) was occupied by *Oidium* [*Oospora*] *lactis* [*R.A.M.*, xvii, p. 530]. The organisms were grown on Koch's malt gelatine (except *O. lactis*, for which yeast water gelatine was used).

The optimum relative humidities for the growth of *A. niger* and *A. glaucus* in a steam-saturated atmosphere were 98 and 93 per cent., respectively. The optimum temperature for *A. glaucus* was found to be about 30° C., while 20° was more favourable to *P. glaucum*, *R. nigricans*. *Phycomyces nitens*, and *O. lactis*.

The absolute minimum for normal growth and reproduction was found to be 73·3 per cent. relative humidity (*A. glaucus*), the corresponding values for *A. niger*, *Penicillium glaucum*, *S. grandis*, *R. nigricans*, *Phycomyces nitens*, *U. avenae*, and *O. lactis* being 79, 77·8, 83·3, 84·1, 86, 87·8, and 89·8, respectively.

In salt solutions the vapour pressure limits were higher than those obtained on a solid medium (12 per cent. in calcium chloride and 6 per cent. in sodium chloride, potassium chloride, and a 'balanced' solution containing, in addition to the foregoing, magnesium chloride and magnesium sulphate).

Diehl (R.). **La Pomme de Terre. Caractères et description des variétés.** [The Potato. Characters and description of the varieties.]—157 pp., 65 col. pl., 12 figs., 1 graph, Paris, Imprimerie Nationale, 1938. 60 fr.

In this useful work the author devotes a chapter to varietal reaction to the principal potato diseases. The degree of resistance to the chief diseases is also indicated for each of the 96 varieties described.

Manil (P.). **À propos d'une nouvelle méthode d'examen des tubercules de Pomme de terre, en vue du diagnostic de viroses.** [On a new method of examination of Potato tubers from the standpoint of virus diagnoses.]—*C.R. Soc. Biol., Paris*, cxxx, 1, pp. 80–84, 1939.

The results obtained by the writer in the application of Friedrich's Biuret method to the diagnosis of potato viruses [*R.A.M.*, xvii, p. 763] were conflicting, the most consistent data being given by local (Gembloux, Belgium) material of Industrie affected by generalized leaf roll. The observations on the same variety suffering from mosaic (A) and streak (Y) were contradictory. These discrepancies, however, need not

necessarily detract from the value of the method, more especially as the author's approach to the virus problem is somewhat different from Friedrich's, the former being more concerned with the 'clinical' and the latter with the physiological aspects of the disorders.

Philipp (W.). **Anfälligkeit der Kartoffelsorten für Eisenfleckigkeit.** [Varietal susceptibility of Potatoes to 'Eisenfleckigkeit'.]—*Kranke Pflanze*, xvi, 4, pp. 69–71, 1939.

Lists are given of (*a*) culinary and (*b*) industrial potato varieties grouped according to their reactions to 'Eisenfleckigkeit' [*R.A.M.*, xviii, p. 476]. Category (*a*) comprises ten practically immune varieties (Frühbote, Mittelfrühe, Edelgard, Voran, Konsuragis, Preussen, Havilla, Venus, Feldglück, and Edelragis); twelve slightly susceptible (Frühmölle, Juli, Aal, Allerfrüheste Gelbe, Zwickauer Frühe, Weltwunder, Priska, Sabina, Ostbote, Industrie, Bardengold, and Goldgelbe); seven fairly susceptible (Erstling [Duke of York], Sieglinde, Flava, Ovalgelbe, Ackersegen, Edda, and Altgold); and ten highly susceptible (Früheste Delikatess, Frühgold, Krebsfeste Kaiserkrone, Dir. Johannsen, Lichtblick, Alpha, Erdgold, Goldwährung, Treff As, and Jubel). There are no semi-immune varieties in group (*b*) but nine slightly susceptible, including Stärkereiche [Starchy] I and Wekaragis, and 15 moderately to highly susceptible, among which are Stärkeragis, Centifolia, Wohltmann, Pepo, and Sickingen.

Beregovoy (P.). К вопросу изучения устойчивости сортов Картофеля против порошистой парши. [A contribution to the study of varietal resistance of Potato to powdery scab.]—*Pl. Prot., Leningr., 1939*, 18, pp. 163–165, 1939.

None of the eight potato varieties tested by the Kieff Quarantine Laboratory showed complete resistance to *Spongospora subterranea* [*R.A.M.*, xviii, p. 379], although the degree of infection was generally low. The highest degree of resistance was exhibited by Wohltmann (12·1 per cent. infection) which is recommended for cultivation on sandy or sub-sandy soils, where with the help of fertilizers and good cultivation it is known to give high yields. No correlation was found between infection with *S. subterranea* and common scab [*Actinomyces scabies*] or *Rhizoctonia* disease [*Corticium solani*], but infection with *Phytophthora* [*infestans*] was found to increase *pari passu* with *S. subterranea* infection. Thus the amount of *Phytophthora* infection in potatoes free from, or showing a low, slightly higher, and high degree of *S. subterranea* infection was 2, 4, 7·5, and 12·2 per cent., respectively.

Cunningham (H. S.) & Wessels (P. H.). **Controlling common scab of the Potato on Long Island by the addition of mercury compounds to the fertilizer mixture and the relation of soil reaction to the treatment.**—*Bull. N.Y. St. agric. Exp. Sta.* 685, 20 pp., 1939.

In experiments carried out on Long Island from 1934 to 1937 Irish Cobbler and Green Mountain potatoes were grown in soil dressed with fertilizer mixture (5–8–5, apparently neutral) containing yellow oxide of mercury or calomel [mercurous chloride] at the rate of 2, 4, and 6 lb.

per ton, and applied at the rate of 1 ton per acre. In 1938 the same area was planted and dressed with fertilizer, but the mercury was omitted.

The data obtained [which are tabulated] showed that under the experimental conditions either yellow oxide of mercury or calomel may advantageously be used in the fertilizer to control scab [*Actinomyces scabies*: *R.A.M.*, xviii, p. 475]. The best results in terms of yield were given by yellow oxide at the rate of 4 lb. per ton, the 2 and 6 lb. treatments producing a smaller increase; and by calomel at the rate of 2 lb., the 4 and 6 lb. treatments giving an insignificant increase. On a basis of marketable, including slightly scabby, tubers, there is little advantage in using more than 2 lb. of either material. The tests in 1938 demonstrated conclusively that to be effective applications of either material must be made every year. Throughout the experiments the Green Mountain variety was more severely affected by scab than Irish Cobbler.

Further tests on the same lines with Green Mountain potatoes to study the effect of soil reaction on the treatment showed that the higher the P_H value of the soil, the greater is the total percentage of scabby tubers and the severity of attack. In these tests only the 4 lb. per ton dose of both materials was employed, and scab was effectively decreased over the range P_H 4·51 to 6. Severity of infection increased rapidly from P_H 5·26 to P_H 5·5, much of this increase occurring from P_H 5·31 to P_H 5·35. Above this point mercury treatment had little commercial value, and therefore is not recommended for soils with a high P_H value.

Blodgett (F. M.). **The effects of some agronomic practices on the incidence of Rhizoctonia.**—*Amer. Potato J.*, xvi, 4, pp. 93–98, 1939.

In the potato rotation experiments in progress in New York State since 1936, more infection (almost fivefold) by *Rhizoctonia* [*Corticium solani*] has been observed on tubers grown on the same plots for three successive years than on those in sites where longer rotations were operative [*R.A.M.*, xviii, p. 52]. In two instances the use of a 5–10–5 fertilizer (1,000 lb. per acre) reduced the number of diseased tubers, a similar effect being obtained with a rye cover crop, while a uniform decrease in the three localities selected for the tests followed the application of stable manure at the rate of 10 to 12 tons per acre. The best control of the fungus was secured by a combination of these three practices.

Leach (J. G.). **Tuber diagnosis of bacterial ring rot of Potatoes.**—*Plant Dis. Reptr*, xxiii, 6, p. 96, 1939. [Mimeographed.]

According to R. W. Goss's observations in Nebraska, the lemon-yellow colour of the vascular tissues of potatoes infected by bacterial ring rot [*Bacterium sepedonicum*: *R.A.M.*, xviii, p. 412] is very well marked and characteristic. The outer cortex often separates from the inner portion of the tuber along the entire affected zone of the vascular region. In many tubers showing these symptoms the pathogen is present in almost pure culture, and Gram-stained preparations made from such lesions usually demonstrate the presence of the causal organism of the ring rot in very large numbers. *Bact. sepedonicum* is easily isolated in pure culture on an appropriate medium if sufficient time is allowed for the development of the slow growing colonies.

Bonde (R.). **Bacterial wilt and soft rot of the Potato.**—*Amer. Potato J.*, xvi, 5, pp. 109–114, 3 figs., 1939.

A popular account is given of potato bacterial wilt and soft rot (*Phytomonas sepedonica*) [*Bacterium sepedonicum*: see preceding abstract]. Experiments in Maine have shown that the disease is perpetuated to the extent of 50 to 90 per cent. by means of the tubers, and that it spreads very rapidly in the field, especially on hill-side slopes, 15 to 40 per cent. infection having been observed in places where only a trace was present in the previous year. Contaminated seed stock is a source of dissemination, 60 to 80 per cent. infection developing in freshly cut seed pieces through contact with diseased tubers. Wilt is also spread by means of knives used for cutting seed, 60 per cent. infection arising from this source in the greenhouse and 30 to 40 per cent. in the field. The sole practical method of control is the use of healthy seed.

Fukushi (T.). **Retention of virus by its insect vectors through several generations.**—*Proc. imp. Acad. Japan*, xv, 5, pp. 142–145, 5 diags., 1939.

Evidence is presented for the protracted retention of the rice dwarf virus by females of the insect carrier *Nephotettix apicalis* var. *cincticeps* [*R.A.M.*, xvii, p. 562], in one instance for a period of over a year (7th April, 1938, to 24th April, 1939), or seven generations of the leafhopper. In the same experiment, infections were produced in more than 1,000 rice plants by 26 leafhoppers of five generations proceeding from one viruliferous egg. It would appear from these data that the virus multiplies within the bodies of the insect vectors, since the amount originally present in one egg must be infinitesimal.

Dennis (A. C.) & Dennis (R. W. G.). **Boron and plant life. Part III. Developments in agriculture and horticulture, 1937–38.**—Reprinted (with addition of bibliography) from *Fertil. Feed. St. J.*, 19 pp., 7 figs., 1939.

In continuation of the earlier work by R. W. G. Dennis on the same subject [*R.A.M.*, xvii, p. 63], the authors notice some 200 papers on work during the period under review, dealing with boron in relation to plant life.

Mulder (E. G.). **Über die Bedeutung des Kupfers für das Wachstum von Mikroorganismen und über eine mikrobiologische Methode zur Bestimmung des pflanzenverfügbaren Bodenkupfers.** [On the importance of copper for the growth of micro-organisms and on a microbiological method for the determination of the soil copper available for plants.]—*Arch. Mikrobiol.*, x, 1, pp. 72–86, 4 figs., 1 graph, 1939.

The writer's studies on the function of copper in the prevention and control of reclamation disease of oats and other cereals in Holland, and his description of the microbiological technique employed for the determination of the available quantities of the element in the affected

soils have already been noticed from other sources [*R.A.M.*, xvii, p. 623; xviii, p. 241].

James (N.) & Sutherland (Marjorie L.). **The accuracy of the plating method for estimating the numbers of soil bacteria, actinomyces, and fungi in the dilution plated.**—*Canad. J. Res.*, Sect. C, xvii, 3, pp. 72–86, 9 graphs, 1939.

The accuracy of the plating method for estimating the soil population was subjected to statistical tests in Manitoba during 1936, 1937, and 1938 on 1,465 samples of field soil by comparing the mean counts of four replicate plates from one dilution with the theoretically expected values. Fungal counts of plates from a 1 : 5,000 dilution (plated one day after sampling) made after four days' incubation at 25° to 28° C. closely agreed with the expected values, and show that the method provides a reasonably accurate estimate of the population capable of developing under the conditions of growth. Counts of *Actinomyces* similarly conformed to expectation. On the other hand, bacterial counts, made of plates from 1 : 200,000, 1 : 800,000, or 1 : 500,000 dilutions showed higher values than the expected ones when samples were plated one day after they were taken from the field, but conformed to expectation when plating was done within a few hours of sampling. Plates with large numbers of pin-point colonies or overgrown with Mucorales gave abnormally high values and should be excluded from bacterial counts. It is concluded that the plating method provides a satisfactory estimate of the bacterial population of soil provided the plating is carried out within six hours of sampling.

James (N.) & Sutherland (Marjorie L.). **The accuracy of the plating method for estimating the numbers of bacteria and fungi from one dilution and from one aliquot of a laboratory sample of soil.**—*Canad. J. Res.*, Sect. C, xvii, 4, pp. 97–108, 1939.

In further tests of the plating method for estimating the soil population [see preceding abstract], six 25 gm. aliquots taken from a soil sample were each plated in six replicate dilutions with four replicate plates from each dilution for fungal counts, and for bacterial counts each replicate dilution was raised and the final dilutions plated in four replicates. The data for fungal counts showed no significant differences among replicate dilutions from one aliquot, but only among aliquots taken from the same soil sample, while in bacterial counts significant differences existed both among dilutions from one aliquot and, as established in several further experiments, among aliquots taken from the same soil sample. The variation among aliquots was much greater than that among replicate dilutions of one aliquot. None of the technical operations added anything significant to the error of plating. These data show conclusively that one 25 gm. aliquot does not provide an accurate estimate of the population of fungi or bacteria in the soil sample. It is suggested that six aliquots should be plated in three replicate dilutions with one plate for each dilution. The practical value of the plating method thus appears to be rather limited, but it may be improved by carefully designed experiments and the application of statistical methods.

Annual Report on the Department of Agriculture, Zanzibar Protectorate, 1938.—38 pp., 1 graph, 1939.

In the section of this report (pp. 17–19) dealing with sudden death of cloves in Zanzibar [*R.A.M.*, xviii, p. 548] A. H. Campbell states that the symptoms are those of a rapid wilt and subsequent death and drying out of the leaves. Almost entire loss of the absorbing root system has already occurred when these symptoms first become apparent. Possibly the disease of the roots may be of long standing, the final phase of leaf wilting and discoloration being induced by the coincidence of several factors, mainly the drying power of the atmosphere. This view is supported by the fact that most of the trees die off between December and April, when high temperatures accompanied by strong winds prevail. Affected trees tend to occur in groups, and areas previously severely affected continue to show many losses, which appears to indicate that infection spreads from tree to tree, or, less probably, that a predisposition to 'sudden death' is brought about by soil conditions.

The relation of clove die-back [ibid., xvi, p. 301] to 'sudden death' is as yet obscure. The fact that trees affected by die-back do not recover as vigorous trees should if affected only by mechanical injury would indicate that such injury is not the only cause of the condition.

No evidence was obtained of phloem necrosis, or of the presence of flagellates, in connexion with 'sudden death'. Pycnidia of a member of the Sphaeriodeae were found on the dead rootlets and roots of all of 84 affected trees examined, and similar pycnidia were observed in connexion with severe die-back.

As little appears to be known of the distribution of 'sudden death' in Zanzibar, apart from the Government gardens, a survey of the incidence of the disease and of severe die-back has been undertaken.

Rud (P. I.). Історія розвитку **Sphaerotheca fuliginea Poll.** на **Calendula officinalis L.** [The life history of *Sphaerotheca fuliginea* Poll. on *Calendula officinalis* L.].—*Тр. Инст. Бот. Харк. Унив.* [*Trav. Inst. Bot. Univ. Kharkoff*], iii, pp. 79–101, 11 figs., 1938. [English summary. Received June, 1939.]

Sphaerotheca [*humuli* var.] *fuliginea* [*R.A.M.*, xviii, p. 84] was found attacking *Calendula officinalis* in several parts of Kharkoff, Russian Ukraine, at the end of July. The conidia germinate in rain water at 12° to 30° C., the optimal temperature being 22° to 26°. Artificial infection with either ascospores or conidia was successful in nature as well as in the laboratory at 15° to 20°, the incubation period being three to five and five to seven days, respectively. Ascospores develop in the autumn but mature completely only in July of the following year. No noticeable damage is caused to the plant until the leaves become densely covered with the mycelium and dry up. It is suggested that at least the first yield of the ligulate flowers can be saved by sowing early. In cross-inoculation experiments the author established three distinct physiologic races: forma *calendula* Jaczewski, f. *bidentis* Jaczewski, and f. *taraxacum* Potebnia, of which the first is only capable of infecting *C. officinalis*, the second only *Bidens tripartitus*, and the third only *Taraxacum officinale*.

Komirna (Mme O. M.). **Erysiphe umbelliferarum D.B. f. anethi Jacz.** на **Foeniculum officinale All.** [*Erysiphe umbelliferarum* D.B. *f. anethi* Jacz. on *Foeniculum officinale* All.]—*Тр. Инст. Бот. Харк. Унив.* [*Trav. Inst. Bot. Univ. Kharkoff*], iii, pp. 103–106, 1 fig., 1938. [Received July, 1939.]

The author records *Erysiphe umbelliferarum* f. *anethi* for the first time on fennel (*Foeniculum officinale*) [*F. vulgare*] in the Botanical Gardens at Kharkoff, Russian Ukraine. The fungus is considered to be identical with the species described by Jaczewski on dill (*Anethum graveolens*) in spite of certain discrepancies in measurements, ascribed to different ecological conditions and in part to inadequate data in Jaczewski's description. For instance, Jaczewski gives no measurements for conidia and appendages, his ascocarps measure 100 to 110 μ in diameter, asci (usually three) 60 by 45 μ, and ascospores (usually three to four) 20 to 25 by 12 μ, while in the isolation from fennel the conidia measure 31 to 43·4 by 12·4 to 17·5 μ, the ascocarps 84 to 118 (up to 127) μ in diameter, 102 to 185 μ long, asci (usually 4 to 5) 59 to 71 by 31 to 43·4 μ, and ascospores (usually 4 to 5) 18·6 to 24·8 by 10·8 to 15·5 μ. Both fennel and dill plants inoculated in the laboratory with the conidia of the species from fennel developed the conidial stage after eight to ten days, and subsequently ascocarps.

Ryker (T. C.). **The Rhizoctonia disease of Bermuda Grass, Sugarcane, Rice, and other grasses in Louisiana.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 198–201, 2 figs., 1939.

In Louisiana, Bermuda grass (*Cynodon dactylon*) is frequently infected by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, xii, p. 355] after showery periods in summer. Infection appears in rather definite, gradually spreading areas in the field, in which every plant shows severe blight of the leaves and leaf sheaths, which bear large, irregular, bleached spots with reddish-brown margins. The roots appear to remain unaffected, and the stems show only slight attack. Many other grasses in the affected areas are attacked.

Towards the end of July, 1938, a field of sugar-cane showed a high percentage of plants infected by *C. solani*, the disease being in every instance associated with affected plants of Bermuda grass in contact with the sugar-cane. On the older sugar-cane plants the injury was confined to the lower leaves and leaf sheaths, but on the young suckers emerging from the base of the stool all the aerial parts were affected. The diseased leaves bore large, irregular, bleached areas with reddish-brown margins, which, where whole leaves were affected, formed bands across the leaf. These symptoms closely resemble those described by A. F. Bell for 'banded sclerotial disease' (*Bull. Div. Path. Sug. Exp. Sta. Qd* 2, 1929) [*R.A.M.*, xi, p. 203, and below, p. 626], and by F. S. Earle for banded sheath spot, attributed to *R. grisea* [ibid., ii, p. 261].

The common sheath spot of rice in Louisiana is caused by *R. oryzae* [ibid., xvii, p. 622], but occasionally *C. solani* produces similar symptoms. In very wet weather a strain of the latter fungus may grow up over the whole rice plant, producing symptoms closely resembling those on sugar-cane and Bermuda grass. In several instances, Bermuda

grass growing along the edge of rice fields containing affected plants showed injury from the fungus. The organism involved was in every instance a strain of *C. solani* producing large, distinct, irregular, greyish-white, later greyish-black sclerotia, flattened on the bottom and rounded on top, on the surface of the culture media and sometimes on the host and the soil of the affected areas. This appears to be the fungus described by Matz as *R. grisea* on the aerial parts of sugar-cane in Puerto Rico [ibid., i, p. 274]. It also resembles the fungus found on rice and other plants in the East, and variously described as *Hypochnus* [*C.*] *sasakii* [ibid., xiv, p. 795; xv, p. 49] and *R.* [*C.*] *solani* [ibid., vi, p. 252; xiii, p. 725]. The Louisiana strain (or strains) differs from the common strain of *C. solani* associated with root rot and damping-off of various plants in Louisiana, the latter producing small sclerotia or only indefinite masses of sclerotial cells in culture.

Tims (E. C.). **Dwarf or multiple bud disease of Sugarcane in Louisiana.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 467–471, 6 figs., 1939.

In 1928, P.O.J. 234 sugar-cane growing in Louisiana showed a condition closely resembling the dwarf disease reported from Australia [*R.A.M.*, xvi, p. 61]. Isolated stools of small, stunted, grass-like cane were also noted on P.O.J. 979, 2714, and 2725, but most of the affected stools in these varieties developed some normal stalks before the end of the season. One field of P.O.J. 234 plant cane in a low, poorly drained locality showed heavy infection. Occasionally, a dwarfed stool was noted in plantings of P.O.J. 234 in other parts of Louisiana, but little or no spread occurred except in Orange Grove. Transmission was ascertained to occur through the stubble.

Yearly plantings were made from diseased P.O.J. 234 material collected in 1928 up till 1937, and dwarfed, yellow stools were produced every year, but no natural spread has occurred. Of late years the diseased plants all died after the first year.

In Louisiana the affected stools are much stunted, and consist of a bunch of very small shoots emerging from a central point. As many as 50 shoots may be present in one stool, mostly not over 12 in. high. Some stools show one or two stalks 2 to 4 ft. high, with numerous small, proliferated shoots at the nodes. Many of the small shoots die during the growing season. The leaves on affected plants are pale yellow and quite small, and the older ones show reddish, necrotic spots. All attempts at artificial transmission failed.

Edgerton (C. W.). **Stubble deterioration.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 334–342, 1 graph, 1939.

Most sugar-cane varieties now grown in Louisiana are highly resistant to stubble deterioration [*R.A.M.*, xiv, p. 469], though different varieties are not necessarily affected by identical deterioration factors. For some years all sugar-cane varieties and promising introductions have been submitted in Louisiana to stubble deterioration tests. If the percentage of good eyes on stubbles under test is compared with the percentages found on varieties of known resistance or susceptibility, the stubble deterioration characteristics can be determined with some accuracy.

Susceptible varieties are classed as dangerous canes, and in future will not be released.

Le Beau (F. J.). **The relation of environmental factors and antagonistic organisms to root rot of Sugarcane and Corn.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 342–347, 3 figs., 1939.

In greenhouse and field experiments conducted from 1936 to 1938 in Louisiana the growth of maize and sugar-cane was studied in different types of soil, at different P_H values, at different temperatures, and under various nutrient conditions, with special reference to the effect of these variations on the action of *Pythium* organisms infecting the roots and of *Trichoderma* spp. attacking the *Pythium*.

The data obtained showed that low temperatures favoured *Pythium* attack. Changes in the P_H value had no appreciable effect. Applications of nitrates increased root rot, while high phosphate treatments reduced it. On the whole, neither nitrates nor phosphates had any marked effect on the antibiotic action of *Trichoderma* against *Pythium*. A strain of *Trichoderma* from New Jersey was much more antagonistic to the *Pythium* than most of the cultures from Louisiana.

Rands (R. D.) & Dopp (E.). **Pythium root rot of Sugarcane.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 680–681, 1939.

This is an abstract of a paper already noticed from another source [*R.A.M.*, xviii, p. 343].

Abbott (E. V.). **Cytospora rot of Sugarcane in Louisiana.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 447–457, 2 figs., 1939.

After describing the symptoms of sugar-cane infection by *Cytospora sacchari* [*R.A.M.*, xviii, p. 139], the author discusses its importance as a disease of the leaf sheaths, seed cuttings, and stubble rhizomes in Louisiana. Losses result from reduced stands of plant cane brought about by deterioration of the seed cuttings, while the disease also reduces the yields of cane by killing the suckers. The disease does not appear to be of importance as a cause of stubble deterioration.

Two years' field tests with C.P. 28/19 indicated that the mortality of suckers from sheath infection was insignificant among those originating early in the season, but that the disease might reduce the weight of millable stalks from such suckers by from 13 to 22 per cent. The mortality among suckers appearing in late May or early June ranged from 67 to 85 per cent., and the loss in cane weight from infected shoots from 79 to 85 per cent. As compared with unfertilized cane, cane given nitrogen fertilization in normal or excessive quantities showed marked reduction in the percentage of sheath infection.

Field observations on the intensity of sheath infection showed C.P. 28/19 and C.P. 29/320 to be highly susceptible, C.P. 807, C.P. 28/11, and Co. 281 to be susceptible, and Co. 290 and P.O.J. 36, 213, and 234 to be resistant. Under Louisiana conditions varieties of *Saccharum*

officinarum, *S. barberi*, *S. sinense*, and *S. spontaneum* were resistant, severe damage being confined to certain hybrids of complex inheritance.

ABBOTT (E. V.). **Red rot of Sugarcane.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 682–683, 1939.

This is a summary by the author of a study of red rot (*Colletotrichum falcatum*) of sugar-cane already noticed from another source [*R.A.M.*, xviii, p. 344].

ATKINSON (R. E.). **On the nature of resistance of Sugarcane to red rot.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 684–692, 5 figs., 1939.

Investigations carried out in Louisiana into the nature of the lateral and longitudinal spread of *Colletotrichum falcatum* [see preceding abstract] in sugar-cane stalks demonstrated that spore migration in the ducts of the fibrovascular bundles is the cause of spread up and down in stalks inoculated by boring [*R.A.M.*, xvii, p. 68]. As the injury to cane stalks increases in proportion to the number of spores of *C. falcatum* introduced, it is desirable, when studying the comparative pathogenicity of isolates, to use approximately equal spore concentrations in inoculations.

Some varieties, owing to the fact that comparatively few vessels extend continuously from one internode to another, show morphological resistance to spore spread. In certain varieties, lateral growth of the mycelium from the vessels is inhibited, the lesions, as a result, being small, and the injury reduced. Physiological resistance to lateral spread in the node and morphological resistance to longitudinal spread combine to give C.P. 29–320 its so-called 'tolerance'. C.P. 29–116, regarded as resistant by some workers and susceptible by others, has the greatest resistance to longitudinal spread but lacks marked resistance to lateral, while with Co. 281 the reverse obtains. Resistance to lateral spread may not prove effective against some physiologic races of *C. falcatum*, but the morphological resistance shown by C.P. 29–116 may be expected to remain a constant character.

RODRIGUES (A. J.). **Behavior of Co. 290 in São Paulo.**—*J. Agron., S. Paulo*, ii, 1, pp. 9–20, 1939. [Portuguese. Abs. in *Facts ab. Sug.*, xxxiv, 7, p. 39, 1939.]

The prolific Co. 290 sugar-cane variety, introduced into São Paulo, Brazil, in 1930, is resistant to mosaic [*R.A.M.*, xviii, p. 346], susceptible to, but tolerant of, red rot [*Colletotrichum falcatum*], and has been reported elsewhere to be immune from gummosis [*Bacterium vasculorum*] and streak.

GRILLO (H. V. S.). **On the red stripe of Sugarcane in Brazil.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 427–430, 2 figs., 1939.

In a trial of varietal resistance in sugar-cane to red stripe disease (*Bacterium rubrilineans*) [*R.A.M.*, xvi, p. 127; xviii, p. 274] carried out in Rio de Janeiro, P.O.J. 36 was very susceptible, P.O.J. 2878 susceptible, and P.O.J. 161 and 2725 resistant or tolerant. In another experiment at Campos, P.O.J. 36 was not markedly susceptible, and the varieties most

susceptible in this locality were those least affected at Rio de Janeiro. This disparity is attributed to differences in the climates of the two localities, particularly as regards humidity. Top rot is a characteristic symptom under very humid conditions and may cause appreciable injury.

Isolations on Liebig's agar from red stripes of the leaf and infected top joints of P.O.J. 36 produced milky-white colonies, which saccharified starch, produced hydrogen sulphide but not indol, and utilized nitrogen in the form of ammonia. Repeated inoculations gave some positive results, especially on one- to four-months'-old plants during a rainy period when the [atmospheric] humidity amounted to 85 per cent.

McMartin (A.). **Some preliminary trials on the control of sett-rot in Natal.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 457–461, 1939.

In an experiment carried out in Natal to explore the possibility of improving sugar-cane germination and stands by preventing sett rot [*R.A.M.*, xvi, p. 774] due to soil fungi, attack by which is favoured by the dry conditions for planting sugar-cane locally, the trashed cuttings were dusted with ceresan and agrosan, and the results compared with those given by watering the soil before planting with formalin, Cheshunt compound, and cresylic acid. Germination counts based on four replications of each treatment with a known number of planted buds per plot showed significant increases, as compared with the untreated controls, only in the plots given the two mercurial treatments (60 per cent. germination, as compared with 29·5 per cent. for the controls). Ceresan reduced the time required for germination to take place by nearly a week, with resultant acceleration of the rate of tillering, the ceresan-treated plots, after two months, during which a period of drought occurred, showing five times as many tillers as the controls.

In a pot test under glass abavit, agrosan, and ceresan dusts were applied to the varieties Co. 281, Co. 290, and Co. 301 under dry, optimum, and waterlogged soil conditions. No varietal difference in response was noted and the treatments increased germination significantly only under the dry conditions. Soaking the cuttings in a soluble form of ceresan killed the young buds and retarded shoot growth from the older ones.

A comprehensive field test was carried out on a clay and also on a light sandy soil, using ceresan and agrosan, to ascertain whether the dust was as effective when applied in the furrow at planting as when applied to the cuttings before planting, and further, to determine whether the efficacy of the dust was impaired if it was used when mixed with artificial fertilizer. The varieties tested were Co. 281, Co. 290, and Co. 301. The results demonstrated that application in the furrow was effective only on the sandy soil, and when the fungicide was not mixed with fertilizer. When the experiment was repeated in pots under glass, Co. 301 (a poor germinating variety) gave a better response to the treatments than did the others. Germination of the untrashed cuttings was increased from an average of 46 per cent. in the untreated controls to one of 70 per cent. in the treatments. It is concluded that, if a satisfactory method of applying the dust can be devised, sett treatment with organic mercury compounds can be of much advantage under Natal conditions.

Summers (E. M.). **A study of the common mosaic of Sugarcane with special reference to strains of the virus.**—Abs. in *Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 564–565, 1939.

The author recognizes and designates by letters ten strains and substrains of the common sugar-cane mosaic virus [*R.A.M.*, xvi, p. 276], strains A to D corresponding to the four strains previously described [ibid., xiv, p. 123].

Strain A produces ordinary mosaic symptoms. Strains B and C produce severe chlorosis and some necrosis in the sugar-cane variety C.P. 31/294 but the latter fails to produce the typical sheath discoloration and stunting in C.P. 29/291. Strain C causes a severe mosaic pattern in Co. 281, usually accompanied by some necrosis, and often blights or kills the growing part of C.P. 31/294 seedlings. Strain D and its substrains Da, Db, and Dc cause similar symptoms in C.P. 31/294 but D causes ordinary symptoms in Co. 281, which shows a high percentage of germination recovery to Da, gives a mild necrotic response on the older leaves to Db, and scattered purplish leaf lesions to Dc. Co. 281 is very resistant to strain E and recovers from it, while strain F on C.P. 31/294, Co. 281, and C.P. 29/291 causes a fine regular pattern, often nearly masked, but produces necrosis and stunting in C.P. 807, a variety long considered immune from mosaic.

The results of a survey of the distribution of these strains in Louisiana are briefly indicated.

Shaffer (M. L.). **Seed selection and roguing in the practical control of mosaic disease of Sugarcane in Louisiana.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 554–563, 1939.

In tests carried out in Louisiana in 1937 and 1938 plots in representative areas of the sugar belt were planted with selected seed of the chief sugar-cane varieties and rogued for mosaic throughout the season, records being made of the extent and cost of the procedures. Other test plots surrounded by mosaic cane were planted but under the conditions obtaining only slight mosaic infection occurred.

The results obtained [which are tabulated] indicated that seed selection alone may reduce the percentage of mosaic in non-isolated plots to one-third or one-fourth of that present in the field-run cane, and that if roguing is practised as well as seed selection the disease can be virtually eliminated in some, and controlled in all varieties. Comparisons of the yields from the healthy and mosaic cane considered in relation to the cost of seed selection and roguing indicate that the operations in question are of practical interest wherever losses from mosaic are appreciable or likely to become so.

Forbes (I. L.). **Immunity studies with Sugarcane mosaic.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 566–572, 1939.

In investigations into the identity of different sugar-cane mosaic viruses present in Louisiana [*R.A.M.*, xvi, p. 276; xvii, p. 68] the green and yellow mosaics of C.P. 28–70 were passed separately through

Co. 281, C.P. 28–70, and through maize, and back to C.P. 28–70, retaining their identities. When the same two viruses were mixed in equal quantities, by volume, of expressed plant juices, and were passed through either of these two sugar-cane varieties or maize and back to C.P. 28–70, the symptoms produced demonstrated almost invariably that only one of the two strains inoculated into the first variety gave rise to the symptoms produced. Similar results were obtained by passing the yellow mosaic viruses of C.P. 28–11 and C.P. 28–19 through maize and back to C.P. 28–11 and C.P. 28–19, respectively, and to C.P. 28–70. The results indicate that the mosaics in question are due to single viruses, and not to mixtures.

The inoculation of C.P. 28–70 plants showing green mosaic with yellow mosaic virus and of plants showing yellow mosaic witn green mosaic virus showed that the green mosaic produces immunity against yellow mosaic, and the yellow mosaic against green mosaic. Healthy plants inoculated with the green mosaic virus of C.P. 28–70 are generally immune from infection when the yellow mosaic is inoculated into them four days later, whereas plants inoculated first with the yellow mosaic virus and then the green showed some with green mosaic and some with yellow mosaic. The very mild mosaic sometimes present in Louisiana Purple sugar-cane does not protect this variety against severe mosaic, nor does it confer immunity from the yellow mosaic of C.P. 28–70.

Matz (J.). **Comparative study of Sugarcane mosaic in different countries.** —*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 572–580, 2 figs., 1939.

The author points out that an important factor in the spread of sugar-cane mosaic is the virulence, specificity, and transmissibility of the chief strains of the virus occurring in the localities concerned [cf. *R.A.M.*, xviii, p. 346]. Mosaic virus from four different sugar-cane varieties originating in one large geographical zone in the Pacific Islands intercepted on three separate occasions proved to be innocuous and transmissible only with difficulty to the susceptible varieties P.O.J. 234, C.P. 28/60, and Louisiana Purple in quarantine. The strain obtained from H–109 from Hawaii produced no perceptible symptoms when transferred in quarantine to C.P. 28/60 and 31/294, though unmistakable symptoms were produced on all the plants of these varieties inoculated with common strains from Louisiana. The evidence so far obtained indicates that in the Pacific region there exists strains of mosaic less virulent and less easily transmitted to sugar-cane varieties susceptible to the Louisiana strains than are these latter strains themselves. Other work indicated that two strains from Puerto Rico, one from Spain, and one from India were identical with the moderately severe and highly infectious sugar-cane virus 1 B Summers (formerly designated strain 2) in Louisiana [ibid., xvi, p. 276].

Sorenson (H.). **The behavior of mosaic on certain soils and mosaic in regard to Cane breeding.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 357–360, 1939.

Studies conducted by the author in Cuba showed that spread of sugar-cane mosaic [see preceding abstracts] was virtually nil on the red

lands (Matanzas clay, Perico clay, and Truffin soils) in Camaguey and Matanzas Provinces, whereas on other soils in Pinar de Rio, Santa Clara, and Oriente Provinces the rate of spread was high. Further investigations in Colombia revealed similar differences in rate of spread in different localities. The highly susceptible standard variety Caña Blanca (Otaheite) showed very little mosaic, with a very slow rate of spread, in the fertile, alluvial, sandy soils in the lower part of the Palmira valley, but in the higher parts near the eastern mountains spread was so rapid that plantings from clean seed of susceptible varieties showed nearly 100 per cent. infection four or five months after planting.

A test was then carried out in Colombia in which rows of 100 per cent. mosaic Caña Blanca were planted with alternate rows of healthy seed of a few susceptible and moderately resistant varieties. In five months all the Caña Blanca canes developed mosaic, while the remainder showed 25 to 40 per cent. infection. As soon as a stool showed the disease it was treated with small amounts of manganese, copper, zinc, lead, boron, iodine, and chromium. A month later, the symptoms had disappeared from several of the moderately resistant varieties treated, and from a few of the treated susceptible varieties. From this result it is tentatively concluded that the presence of these elements, or some of them, in the soil may partly or wholly check mosaic, and that the difference between susceptible and resistant varieties may result from the greater ability of the latter to absorb very small amounts of these elements.

Report on the work of the Department of Science and Agriculture for the year ending March 31st, 1938.—*Agric. J. Barbados*, vii, 2, pp. 27–85, 2 col. graphs, 1938. [Received May, 1939.]

On p. 35 of this report it is stated that in Barbados sugar-cane mosaic [*R.A.M.*, xiii, p. 803] is kept in check by official inspection and the distribution of clean planting material to small growers in proclaimed areas. Two varieties so distributed during the period under review were B. 3254 and B. 35187, both bred in Barbados and derived from P.O.J. 2725 crossed with Barbados seedlings. Gumming disease [*Bacterium vasculorum*: ibid., xviii, p. 269] is now completely controlled as a result of the growing of resistant seedlings; it is, however, still present, and the situation is being kept under careful observation.

Report on the British West Indies Central Sugar-Cane Breeding Station for the year ending September 30th, 1938.—31 pp., 14 diags., [? 1939].

Roguing for the control of sugar-cane mosaic, though practised in Barbados [see preceding abstract], is impracticable in certain other West Indian islands, including parts of Jamaica, and therefore one of the major projects of the Barbados breeding station is the production of high yielding, resistant, good quality seedlings. Tests by artificial inoculation having proved no more reliable than the natural infection method, the latter is now exclusively used, the seedlings under test being laid out in single row plots and separated by alternate rows of susceptible canes and maize. Inspections are made at fortnightly intervals, and

seedlings developing no symptom in 14 to 16 months are regarded as commercially resistant.

STEVENSON (G. C.). **Breeding and testing Sugarcane seedlings for mosaic disease resistance at the British West Indies Central Sugar Cane Breeding Station, Barbados.**—*Proc. sixth Congr. int. Soc. Cane Tech., Baton Rouge, 1938*, pp. 71–75, 1939.

Most of the information in this paper has already been noticed from other sources [see preceding abstract].

STEVENSON (G. C.). **Breeding and testing Sugarcane seedlings for gumming disease resistance at the British West Indies Central Sugar Cane Breeding Station, Barbados.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 75–78, 1939.

The information in this paper has already been noticed from another source [*R.A.M.*, xvii, p. 269].

BITANCOURT (A. A.). **Diseases of the Sugarcane in Brazil.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 187–193, 1 fig., 1939.

In Brazil, the principal sugar-cane disease is mosaic [*R.A.M.*, xvi, p. 126], which has now been reported from nearly all the sugar-cane growing areas in the country. It markedly decreased production before the introduction of resistant varieties. Resistance appears to vary widely with different climatic conditions. Other sugar-cane virus diseases present are sereh [loc. cit.] and streak. Gummosis [*Bacterium vasculorum*: loc. cit.] is now comparatively unimportant, owing to the use of resistant varieties. Root disease (*Marasmius sacchari*, *Schizophyllum commune*, *Sclerotium rolfsii*, and other fungi, possibly in conjunction with unfavourable soil conditions), top rot (*Fusarium moniliforme*) [*Gibberella fujikuroi*], and red stripe disease attributed to *Phytomonas* [*Bacterium*] *rubrilineans* [loc. cit.] are also factors in reduction of yield, and are accompanied by secondary or minor organisms such as *Melanconium* [*Pleocyta*] *sacchari* [ibid., xvii, p. 839; xviii, p. 274] and *Diplodia* [*Botryodiplodia*] *theobromae*. *Ceratostomella paradoxa* [ibid., xvi, p. 774] causes a failure of cuttings.

The principal leaf diseases are *Leptosphaeria sacchari* [ibid., xvii, p. 839], possibly secondary to leaf spots caused by *Helminthosporium sacchari* [ibid., xvi, p. 127] and *H. stenospilum* [loc. cit.], *Cercospora vaginae* [ibid., xvii, p. 843], *C. longipes* [ibid., xvi, p. 206], and the leaf spot associated with *Pyrenochaeta* [*sacchari*: ibid., xviii, p. 346].

Other records include *Gnomonia iliau* [ibid., ix, p. 807], cold [banded] chlorosis [ibid., xvi, p. 561], and *Myriogenospora aciculisporae* [ibid., xvi, p. 599].

HUGHES (C. G.). **Alternate hosts of Bacterium vasculorum.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 430–437, 1 fig., 1939.

In most parts of Queensland gumming disease (*Bacterium vasculorum*) [*R.A.M.*, xviii, p. 274], owing to the use of resistant varieties, is rapidly disappearing from commercial plantings of sugar-cane. In cross-

inoculation studies inoculation of *Bact. vasculorum* into the following plants gave positive results: dent and sweet maize, ten varieties of sweet and grain sorghum, *Sorghum verticilliflorum*, *S. sudanense*, Para grass (*Brachiaria mutica*), *Pennisetum purpureum*, and *S. halepense*. When infection passed from one host to another the symptoms varied widely, but leaf streaks containing patches of dead tissues were present on all, and systemic infection somewhat resembling that found in sugar-cane occurred in maize and sorghum. Gumming was also transmitted from sugar-cane to maize under natural conditions. These results suggest that the disease may have a very wide host range. This possibility should be borne in mind before releasing susceptible varieties for planting in a locality previously affected.

Orian (G.). **Natural hosts of Bacterium vasculorum (Cobb) Gr. Smith in Mauritius.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 437–447, 4 figs., 1939.

The work described in this paper on natural hosts of *Bacterium vasculorum* in Mauritius has already been noticed from another source [*R.A.M.*, xviii, p. 374].

Rosenfeld (A. H.). **Minor Sugarcane diseases in Egypt.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 194–198, 1939.

The only major diseases of sugar-cane present in Egypt are streak [*R.A.M.*, xvii, p. 555] and mosaic [ibid., xii, p. 749], of which the former is much the more important. The minor diseases found (which do not, as a rule, cause appreciable damage) include *Helminthosporium sacchari*, *Leptosphaeria sacchari*, non-infectious chlorosis, rust (probably *Puccinia kuehnii*) [ibid., xvi, p. 561], *Colletotrichum falcatum*, *Cephalosporium sacchari*, *Melanconium* [*Pleocyta*] *sacchari*, *Thielaviopsis* [*Ceratostomella*] *paradoxa*, root rot associated with *Pythium*, *Marasmius*, *Himantia*, or *Fusarium* (of which only the first can be regarded as aggressive, and then only on weakened canes), *Marasmius sacchari* on old leaf sheaths and rhizomes, and, occasionally, *Himatia stellifera* [ibid., xvii, p. 299].

Ocfemia (G. O.). **A review of Sugarcane diseases in the Philippines.** – *Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 183–187, 1939.

Notes are given on the major diseases of sugar-cane found in the Philippine Islands, viz., leaf scald (*Bacterium albilineans*) [*R.A.M.*, xviii, p. 274], downy mildew (*Sclerospora sacchari*) [loc. cit.], smut (*Ustilago scitaminea*) [ibid., xvii, p. 839; xviii, p. 477], mosaic, and Fiji disease [ibid., xviii, p. 274], as well as on the following minor troubles, most of which may cause serious losses under suitable climatic and environmental conditions: *Pythium* root rot (apparently *P. graminicolum*) [ibid., xviii, p. 343], ring spot (*Leptosphaeria sacchari*) [ibid., xvii, p. 839], ergot (caused by an undetermined species of *Claviceps*) [ibid., x, p. 440], *Bakerophoma sacchari* [ibid., ii, p. 109], sooty mould [*Meliola arundinis*: loc. cit.], red rot (*Colletotrichum falcatum*) [see above, p. 619], rind disease, attributed to *Melanconium* [*Pleocyta*] *sacchari* [see preceding abstract], wilt (*Cephalosporium sacchari*) [ibid., xviii, p. 500], yellow spot

(*Cercospora kopkei*) [ibid., xv, p. 346], *Fusarium moniliforme* [*Gibberella fujikuroi*: ibid., xvii, p. 162], *Helminthosporium sacchari* [ibid., xiii, p. 12], pineapple disease (*Thielaviopsis* [*Ceratostomella*] *paradoxa* [ibid., xvi, p. 693], shoot rot (*Sclerotium rolfsii*) [ibid., xvi, p. 127], banded sclerotial disease (*Rhizoctonia* [*Corticium*] *solani*) [ibid., xi, p. 203], rust (*Puccinia kuehnii*) [see preceding abstract], *Marasmius* sheath rot, and 'buñga' caused by the parasitic flowering plant *Aeginetia indica* [ibid., ii, p. 109].

Ocfemia (G. O.) & Celino (M. S.). **Some recent findings regarding Fiji disease of Sugarcane in the Philippines.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 550–554, 2 figs., 1939.

Further studies on Fiji disease of sugar-cane in the Philippine Islands [see preceding abstract] have demonstrated that the disease is transmissible not only by adults but also by second, third, fourth, and fifth instar nymphs of *Perkinsiella vastatrix* [ibid., xvi, p. 125], one adult insect being sufficient to effect transmission. In a diseased cane, the virus may not be distributed throughout the infected stalk.

Kiryu (T.) & Okada (M.). **Sclerotic disease of Sugarcane.**—*Proc. sixth Congr. int. Soc. Sug. Cane Tech., Baton Rouge, 1938*, pp. 785–792, 5 figs., 1939.

In this paper the authors give a preliminary account of investigations into a 'sclerotic disease' of sugar-cane in Formosa. The parenchyma of old cane stems becomes brown, the cell walls are sclerotic, and the affected parts are hard. No symptoms are apparent on the outside of the stem. The lower part of the cane appears to be more susceptible than the rest. A brownish, granular substance is present in the affected parenchymatous cells and the walls of the affected cells of some varieties are sometimes thicker than those of healthy ones and show more distinct lignification. Inoculation experiments all gave negative results, and the disease did not increase when affected cuttings were planted. The disease, which appears to be of physiological origin, does not seem to be fatal, but it decreases the sucrose and increases the reducing sugars and fibre present. The varieties P.O.J. 2725, 2883, and 2878 are, respectively, very susceptible, moderately resistant, and intermediate.

Baldacci (E.). **Contributo alla sistematica degli Attinomiceti. II, III, IV, V–VIII.** [A contribution to the systematics of the Actinomycetes. II, III, IV, V–VIII].—*Atti Ist. bot. Univ. Pavia*, Ser. IV, ix, pp. 299–314, 1 fig., 1937; x, pp. 3–37, 9 figs., 1937; x, pp. 321–329, 3 figs., 1938; xi, pp. 191–231, 13 figs., 1939. [Latin and English summaries.]

In these papers the author continues his studies on the systematic position of a large number of species of Actinomycetes [*R.A.M.*, xvii, p. 457].

Fisher (Eileen E.). **A study of Australian sooty moulds.**—*Ann. Bot., Lond.*, N.S., iii, 10, pp. 399–426, 1 pl., 1 fig., 3 graphs, 1939.

Following a review of the pertinent literature and a critical discussion of recent outstanding contributions to the study of sooty moulds

[*R.A.M.*, xvi, pp. 279, 699], the writer considers the taxonomy of the group and proposes a system of classification based mainly on the macroscopic appearance of their growth. The diagnostic features of six families are given, viz., the Capnodiaceae v. Höhn. emend. E. Fisher, Chaetothyriaceae Th. emend. E. Fisher non Chaetothyrieae Theiss. & Syd. 1917, Microthyriaceae Sacc., Trichopeltaceae Th., Perisporiaceae Fr., and Atichiaceae Millardet emend. Raciborski. Within each family the separation of genera may usually be effected by reference to such ascospore characters as septation and colour, but an exception to this rule is constituted by the Atichiaceae, in which conidial development furnished a more reliable criterion. The sooty moulds further fall into two categories according to their mode of nutrition, namely (*a*) epiphytes, growing in a purely saprophytic manner on 'honey dew'-covered plants and able to develop on culture media, and (*b*) ectoparasites, producing an abundant superficial mycelium but also extracting nutriment from their hosts; these species have not yet been obtained in pure culture.

A tabulated account is then given of the writer's cultural studies at Melbourne University on eight fungi isolated from local epiphytic sooty moulds, i.e., a new species of *Phycopsis* to be described elsewhere, *Capnodium salicinum* [ibid., xv, pp. 25, 530], *Fumagospora* sp., *Hendersoniella* sp., *Antennularia* sp., *Microxyphium* sp., *M. leptospermi* E. Fisher, and *Pleospora herbarum*. The organisms were grown on a medium of 2 per cent. agar and 5 per cent. honey at a temperature range of 10° to 25° C. *Phycopsis* sp. developed best at 15°, whereas the optima for the other species (not including the unspecialized sooty mould component, *Pleospora herbarum*, which flourished at 25°) were found to lie between 18° and 20°, a rapid decline in growth, except in the cases of *A.* sp. and *M. leptospermi*, being associated with a rise above the optimum in the temperature scale. *P. herbarum* was the only one of the experimental fungi succumbing to three days' exposure to a temperature of —10°, followed by ten days at 18°. None of the organisms made any growth at a relative atmospheric humidity of 90 per cent. at 18°, the minimum for *C. salicinum*, *F.* sp., *H.* sp., and *M.* sp., being 92·5 per cent., for *P. herbarum* and *M. leptospermi* 95 per cent., and for *Phycopsis* sp. and *A.* sp. 96 per cent.

In cool-temperate climates the evergreen substrata most conducive to growth of the Capnodiaceae are very scarce during the winter, their season of maximum development, a fact that may account for the restricted incidence of this group in such regions. On the other hand, the warm-temperate climates of Australia and the Mediterranean countries provide an abundance of perennial coniferous foliage on which the sooty moulds are able to establish themselves during the winter and so persist from one season to the next.

Mundkur (B. B.). **A contribution towards a knowledge of Indian Ustilaginales.**—*Trans. Brit. mycol. Soc.*, xxiii, 1, pp. 86–121, 2 figs., 1939.

The author states that the critical re-examination of 49 collections of Indian smuts in the Herbarium Cryptogamae Indiae Orientalis [details of which are included] resulted in their grouping into 25 species,

of which seven are considered to be new to science, and five appear as new combinations. Descriptions and Latin diagnoses are appended of the new species, among which is *Tilletia ajrekari* n.sp., found on a single grain of bulrush millet (*Pennisetum typhoides*) in experimental plots at Ahmedabad. The sorus completely destroys the ovary and protrudes prominently from the glumes; it is ellipsoidal, about 6 mm. long, slightly folded on itself and shrunk, and is enveloped with a black, thick, and firm membrane enclosing the spores which escape from a slit at the apex. The spores, 13·8 to 21 μ (mean 17·7 μ) in diameter, are pulverulent, mostly globose but occasionally aberrant; they are deep brown but not opaque, with an epispore 2 to 3 μ thick, bearing flattened, roughly rectangular, blunt spines very irregularly disposed. Their mode of germination is not known. This smut seems to be very rare, and in its sorus somewhat resembles *Tolyposporium penicillariae*, for which it may be mistaken.

An emended description is given of *U. eleusinis* [*R.A.M.*, ii, p. 309] on *Eleusine coracana*, in which it is stated that the spores have a rough and minutely pitted epispore, the pits having been evidently mistaken by Kulkarni for spines or echinulations. A smut on the same host collected by McDonald at Nairobi, Kenya, agrees very well with the Indian fungus, except that its spores have a wider range and a higher mean diameter: 8 to 14 (mean 10·4) μ as against 7 to 11 (mean 9·6) μ. Sydow's *U. eleusines* [ibid., ix, p. 342] is presumably a different species, but the specific name is not valid, having been already used by Kulkarni.

Shear (C. L.). **Mycological notes. III.**—*Mycologia*, xxxi, 3, pp. 322–336, 1 fig., 1939.

Discussing the results of studies on *Sphaeria gleditschiae*, the author arrives at the conclusion that this species is identical with *Sphaeropsis malorum* Peck (*Physalospora obtusa*) as already pointed out by N. E. Stevens [ibid., xiii, p. 312].

Sampson (Kathleen). **Life cycles of smut fungi.**—*Trans. Brit. mycol. Soc.*, xxiii, 1, pp. 1–23, 1939.

The author reviews in some detail the literature dealing with the life-history of the smut fungi as a group, with particular reference to the behaviour of the nuclei in the promycelium, and critically discusses the various assumptions in regard to the process of nuclear fusion in the formation of the chlamydospores, and to the parasitism of the haploid and diploid mycelia. The paper terminates with a brief consideration of biologic specialization in the smuts.

Keay (Margaret A.). **A study of certain species of the genus Sclerotinia.**—*Ann. appl. Biol.*, xxvi, 2, pp. 227–246, 1 pl., 1939.

A comparative study is reported on *Sclerotinia serica* [*R.A.M.*, xvi, p. 680], *S. sclerotiorum* (from swedes and hops), *S. trifoliorum* [ibid., xviii, p. 318] from clover, vetch, sainfoin (*Onobrychis viciaefolia*), and carrot, a strain of *S. trifoliorum* isolated in four localities in England from *Vicia faba* and given the varietal name *fabae* [without a Latin diagnosis], and a species referred to *S. minor* [ibid., xvii, p. 433] from

Helianthus tuberosus, a new record for Great Britain. On the basis of their pathogenicity, the species were classified in three groups, the first comprising *S. sclerotiorum* and *S. minor*, the second *S. trifoliorum* and its var. *fabae*, and the third *S. serica*. Ascospores of *S. sclerotiorum*, *S. minor*, and *S. trifoliorum* failed to infect various healthy test plants but produced infection on wounded or moribund tissues. The production of mycelium by sclerotia in the soil was not observed in any of the species. *S. serica*, but none of the other species, produced numerous apothecial stipes in cultures aged from six weeks to six months, and some mature apothecia when exposed to light. Sclerotia of *S. sclerotiorum*, *S. trifoliorum* and its var. *fabae* formed in cultures over a wide temperature range produced apothecia when subsequently buried in damp sand and were not influenced therein by different conditions of temperature and moisture. Apothecia developed from monospore lines of *S. minor*, *S. trifoliorum*, and *S. sclerotiorum*, but not from *S. trifoliorum* var. *fabae* and *S. serica*. Apothecia of *S. minor* arising from sclerotia formed on sterilized potato, carrot, or artichoke were larger than those from sclerotia formed on malt extract (average diameter 3·9 and 2·2 mm., respectively), so that the size of the apothecia should not serve as a diagnostic character. The shape and colour of the apothecia, on the other hand, were distinctive, those of *S. sclerotiorum* being light brown and somewhat trumpet-shaped, those of *S. minor* slender in the early stages and more tubular at maturity, the stalk being brown and the disk light buff, those of *S. trifoliorum* and its var. *fabae* tubular and darker than the others. The average size of the ascospores of *S. sclerotiorum*, *S. minor*, *S. trifoliorum*, *S. trifoliorum* var. *fabae*, and *S. serica* was 12·38 by 6·59 μ, 14·1 by 7·88 μ, 15·23 by 8·17 μ, 19·02 by 9·97 μ, and 20·65 by 10·12 μ, respectively, and the average size of the asci 125·7 by 10·15 μ, 149·8 by 12·42 μ, 180·1 by 13·55 μ, 193·98 by 16·41 μ, and 210·54 by 16·87 μ, respectively. The optimum temperature for the lateral growth of the mycelium was 20° C. for all species, except for *S. sclerotiorum* (in one experiment) and *S. minor*, where it was 25°. The time needed to reach a diameter of 6 cm. at 20° was 36·5 to 40, 36·5 to 47, 65·5 to 69, 59·5, and 103 hours, respectively, for *S. sclerotiorum*, *S. minor*, *S. trifoliorum*, *S. trifoliorum* var. *fabae*, and *S. serica*. *S. trifoliorum* var. *fabae* also differs from the normal species in its smaller sclerotia and absence of conspicuous haptera in culture. A variant of *S. trifoliorum* var. *fabae* with light brown sclerotia differed from its parent form in pathogenicity, temperature relations, and appearance in culture.

Schoorel (A. F.) & Boedijn (K. B.). **De steenroode wortelschimmel (Poria hypolateritia).** [The brick-red root fungus (*Poria hypolateritia*).]—*Arch. Theecult. Ned.-Ind.*, xii, 1, pp. 19–25, 3 figs., 1939. [English summary.]

In December, 1938, the fructifications of *Poria hypolateritia* were detected on tea bushes [*R.A.M.*, xvii, p. 705] in plantations at elevations between 1,000 and 5,000 m. above sea-level, mostly on clay-loam soils, to the south-west of Bandoeng and elsewhere in Java. This is stated to be the first authentic report of the fungus in the country, Petch's statement regarding its occurrence in Java in his 'Diseases of

the Tea Bush' [ibid., iii, p. 3] being based on a misconception. *P. hypolateritia* is not of great importance in Java, where the common red root rot of tea is caused by *Ganoderma pseudoferreum*.

GRAINGER (J.). **Temperature relations of Tobacco-mosaic virus and its host.**—*Phytopathology*, xxix, 5, pp. 441–448, 1 fig., 2 graphs, 1939.

Further evidence of the masking of tobacco mosaic symptoms at low temperatures (below 50° F.) in a greenhouse near Huddersfield, Yorkshire [*R.A.M.*, xv, p. 403] is presented. Though the virus is actually present in the symptomless foliage at masking temperatures, the first obvious signs of disease only appear at 65° and reach a climax between 70° and 85°, no difference in virus activity being apparent between these two temperatures. Under local greenhouse conditions the host (Connecticut Havana) is capable of growth between 32° and 108°, attaining its maximum activity at 70°. The temperature of optimal activity of the virus therefore is not wholly coincident with that of its host. Daily plottings of the growth rates of diseased tobacco plants at 85° and 70° show that, for a few days after inoculation, development tends to be delayed at the lower temperatures, though after ten days the reverse uniformly obtains. The virus moves at about the same rate at both temperatures.

LAUFFER (M. A.) & STANLEY (W. M.). **The physical chemistry of Tobacco mosaic virus protein.**—*Chem. Rev.*, xxiv, 2, pp. 303–321, 3 figs., 1 diag., 5 graphs, 1939.

This is a review of recent optical, ultracentrifugation, viscosity, diffusion, X-ray, and other physico-chemical studies in connexion with the shape and size of the tobacco mosaic virus protein particles, most of which have been noticed from time to time in this *Review*.

STANLEY (W. M.) & LAUFFER (M. A.). **Disintegration of Tobacco mosaic virus in urea solutions.**—*Science*, N.S., lxxxix, 2311, pp. 345–347, 1 graph, 1939.

Tobacco mosaic virus protein (10 mg. per c.c.) in 6 M urea and 0·1 M phosphate buffer at P_H 7 was shown to disintegrate into low molecular weight protein (a decrease in molecular weight from a figure of the order of several millions to one of about 100,000 after five days and about 40,000 after four weeks) which was free of nucleic acid and insoluble in dilute buffers. The disintegration was followed by the appearance of free sulphhydryl groups. The low molecular weight material was inactive, and the specific activity of the remaining high molecular weight material was from 10 to 50 per cent. that of ordinary virus protein. Following extensive disintegration practically all the protein was found in the supernatant liquid and only traces remained in the sediment. The disintegration did not appear to be readily reversible by the removal of urea. The rate of disintegration varied widely with the concentration of urea, the concentration and the type of electrolyte, the hydrogen-ion concentration, and the temperature.

KHUDYNA (I. P.). Серологический метод в применении к изучению вирусных заболеваний Табака. [The application of the serological method to the study of virus diseases of Tobacco.]—Всесоюзн. научноисслед. Инст. Табачн. Махорочн. Пром. им. А. И. Микояна (ВИТИМ) [*The A. I. Mikoyan pan-Soviet Sci. Res. Inst. Tob. and Indian Tob. Ind.* (*VITIM*)], *Krasnodar, Publ.* 137, pp. 13–30, 1939. [English summary.]

On the basis of the results of serological tests by the drop method recently described by Dounin and Popova [*R.A.M.*, xvii, p. 762] the author classifies 20 different types of virus diseases of tobacco in the U.S.S.R. [the symptoms of which are briefly described] into seven distinct groups, namely: (*a*) tobacco mosaics, (*b*) cucumber mosaics, (*c*) etch, (*d*) tobacco ring spot, (*e*) wet montar or stolbur [ibid., xvi, p. 49], which is believed to be probably identical with big bud [cf. ibid., xv, p. 406], (*f*) kroepoek or leaf curl [ibid., xviii, p. 481], and (*g*) crinkle dwarf. The method is further claimed to have been effective in demonstrating the complex nature of two diseases caused by mixtures of cucumber and tobacco mosaic viruses, and to have been successfully used in tobacco-breeding experiments by permitting the selection of virus-resistant forms among *Nicotiana glutinosa* × *N. tabacum* hybrids. In disease control work the method might be useful in the determination of the degree of infectiousness of post-harvest tobacco residues, the efficacy of disinfection of such residues, and the like.

KHUDYNA (I. P.). Борьба с табачной мозаикой в производственных условиях. [Control of Tobacco mosaic under practical agricultural conditions.]—Всесоюзн. научноисслед. Инст. Табачн. Махорочн. Пром. им. А. И. Микояна (ВИТИМ) [*The A. I. Mikoyan pan-Soviet Sci. Res. Inst. Tob. and Indian Tob. Ind.* (*VITIM*)], *Krasnodar, Publ.* 137, pp. 57–66, 1939. [English summary.]

The author states that the introduction in 1932 of special control measures in a number of important tobacco farms in the Caucasus has reduced the damage caused by common tobacco mosaic, probably the most widespread and dangerous virus disease of the crop, to one-third or even less. Briefly summarized these measures consist in the stringent disinfection and sanitation of the seed-beds and all planting material; the prohibition of smoking in the plantations; the careful roguing out and destruction by fire of all mosaic seedlings in the seed-beds on the day before planting out; the removal from the fields of all mosaic plants, together with their roots, by special teams avoiding contact with healthy plants; and the rotation of tobacco with other non-susceptible crops, preferably cereals. The soil of the vacated tobacco seed-beds should be kept in fallow during the whole of the following summer.

HOPKINS (J. C. F.). **Diseases of Tobacco in Southern Rhodesia. (Supplement I. 1932 to 1938).**—*Rhod. agric. J.*, xxxvi, 2, pp. 97–119, 6 pl., 1 diag., 1939.

In this contribution to the supplement [*R.A.M.*, xviii, p. 483] of his book on tobacco diseases in Southern Rhodesia, the author gives notes

incorporating the results of recent work on the following diseases: mildew or white mould (*Erysiphe cichoracearum*) [ibid., xvii, p. 847], frog eye (*Cercospora nicotianae*) [ibid., xvii, p. 776], brown stem rot (*Phytophthora parasitica*) [ibid., x, p. 762], black stem rot (*Pythium aphanidermatum*) [ibid., xvii, p. 295], mosaic [ibid., xvii, p. 776], rosette [ibid., xviii, p. 347], leaf curl (formerly referred to as 'crinkle' in Southern Rhodesia) [ibid., xviii, p. 481], chlorine toxicity, frenching [ibid., xvii, pp. 560, 847], lightning injury, barn rot (*Rhizopus arrhizus*) [ibid., xvii, p. 844], and yellow mould (*Aspergillus flavus*) [loc. cit.].

Silberschmidt (K.) & Kramer (M.). **Contribuição para o conhecimento do mosaico do Fumo e dos seus hospedeiros selvagens no Brasil.** [A contribution to the knowledge of Tobacco mosaic and of its wild hosts in Brazil.]—*Arq. Inst. biol. S. Paulo*, ix, 1, pp. 1–20, 4 pl., 1938. [German summary. Received July, 1939.]

Mosaic-diseased tobacco plants collected from various districts of São Paulo, Brazil, were found to fall into six categories in respect of their symptoms, viz., (1) coarse mosaic on the White Stem variety, characterized by coarse, well-defined, dark green spots on the leaves; (2) 'cabbage' form on the same variety, in which the edge of the leaf fails to reach the point of insertion of the petiole on the stem and the margins are crenate; (3) veinbanding on the Yellow variety, marked by dark lines parallel with the secondary and tertiary veins; (4) very mild mosaic of Virginia tobacco, characterized by pale green spots visible only by transparent light; (5) mild mosaic on White Stem, associated with spots and small lines of slightly darker green than normal, without blistering; and (6) papillate form, producing on Yellow a large number of protuberances arranged in rows along the secondary veins.

In inoculation experiments on *Nicotiana sylvestris* the juices of the coarse, 'cabbage', and veinbanding forms induced, after an incubation period of three weeks, well-marked mosaic symptoms accompanied in the case of the last-named by irregular necrosis of the leaf margins. The papillate strain causes chlorosis, followed by mild mosaic in the form of ring spot. Mild mosaic produces mosaic after a lengthy interval, whereas inoculation with very mild mosaic results only in systemic chlorosis and vein-clearing without foliar distortion. No symptoms developed in *Solanum* (?) *reflexum* plants inoculated with the papillate and very mild strains of tobacco mosaic, whereas the other four forms induced more or less identical mottling reactions, slightly differentiated perhaps in the case of veinbanding by a yellow mosaic of the young foliage. In a further series of inoculations on Scotia beans (*Phaseolus vulgaris*) with the six above-mentioned strains and two others, designated (7) pure S. Paulo mosaic, resembling the papillate form, and (8) Campinas mosaic, causing a fine blistering and sparse, indistinct marginal rings, the average numbers of lesions per leaf produced after a week by the mild, 'cabbage', coarse, very mild, papillate, veinbanding, S. Paulo, and Campinas strains were 4·66, 0·287, 4·70, 0·2, 3·79, 1·887, 1·55, and 0·165, respectively.

After ten minutes' heating of the juices from the various diseased plants at 90° C. the very mild mosaic strain was the only one capable of

attacking all four test plants inoculated, viz. beans, *N. glutinosa*, *N. sylvestris*, and Geudertheimer tobacco, producing necrotic lesions on the first two and systemic infection on the others. 'Cabbage' mosaic was pathogenic to all except beans, causing systemic infection of Geudertheimer and *N. sylvestris* and necrotic lesions on *N. glutinosa*. The coarse, papillate, and S. Paulo strains attacked *N. glutinosa* and Geudertheimer, the former reacting by necrotic lesions and the latter by systemic infection. Mild mosaic and veinbanding were pathogenic only to *N. glutinosa* (necrotic lesions), while the Campinas strain was totally inactivated by the treatment. In further inoculation tests with the two sharply differentiated strains, very mild mosaic and veinbanding, after ten minutes' heating at 60° and 90°, positive results were obtained on *N. rustica* var. *brasilia* with both strains five days after inoculation with juice heated at 60° and twelve days after inoculation with that heated at 90°, and on Rei Umberto tomatoes with very mild mosaic 21 days after inoculation with juice heated at 60° and with veinbanding after the same period following inoculation with juice heated at either temperature. The very mild mosaic strain produced typical mosaic symptoms (including filiform new leaves, partially or totally reduced to a petiole) on tomatoes, which reacted to veinbanding by the development of new leaves with a slightly crinkled surface and apical rolling of the margins. In inoculation tests with the juices of the very mild, papillate, Campinas, veinbanding, S. Paulo, and mild strains after ten minutes' heating at 80° the average numbers of lesions per leaf three days later on *N. glutinosa* were 3, 16, 17·6, 29, 40·6, and 53, respectively, the corresponding figures for *N. rustica* var. *brasilia* after eight days being 3·1, 15, 28·5, 24, 23·7, and 28·7, respectively.

It would appear from these data that all the eight strains under discussion are forms of common mosaic, of which at least three, however, differ among themselves in their virus concentration and reaction to heat, namely, veinbanding, mild mosaic, and very mild mosaic.

Inoculation experiments with the S. Paulo strain of tobacco mosaic on a number of wild Solanaceae growing in proximity to tobacco and potato fields gave positive results on *S.* (?) *reflexum*, *S.* (?) *platanifolium*, *S. aculeatissimum*, *S. mammosum*, *S. atropurpureum*, *S. sisymbrifolium*, and *S. nigrum* [details of the symptoms induced on each of which are furnished]. *S. variabile* appears to act as a carrier of the virus without showing any definite symptoms itself. These weeds should be eradicated from the vicinity of tobacco plantations.

Silberschmidt (K.) & Carvalho (J. C.). **Observações citologicas sobre o mosaico do Fumo.** [Cytological observations on Tobacco mosaic.] —*Arq. Inst. biol., S. Paulo*, ix, pp. 261–271, 5 figs., 1938. [German summary. Received July, 1939.]

In order to determine whether the cytological cell inclusions (X- and crystalline bodies) characteristic of tobacco mosaic are present in plants carrying the virus in a masked form without external symptoms, the writers carried out a comparative examination of the leaf trichomes of *Solanum aculeatissimum*, *S. atropurpureum*, *S. sisymbrifolium*, and *S. variabile*, all affected by the disease in São Paulo, Brazil [see preceding abstract]. The two first-named species, which develop the mosaic

symptoms in a severe form, were found to contain numerous inclusions; striate bodies occurred in 38·62 and 4·27 per cent., respectively, of the trichomes of the pale and dark green areas of *S. aculeatissimum*, the corresponding figures for *S. atropurpureum* being 39·56 and 8·59, respectively, whilst the percentages of X-bodies in the trichomes of the pale and dark green areas of *S. aculeatissimum* were 8·27 and 0·16, respectively, and in those of *S. atropurpureum* 15·66 and 0·88, respectively. The ratios of striate to X-bodies in *S. aculeatissimum* and *S. atropurpureum* were 4·66 : 1 and 2·52 : 1, respectively. *S. sisymbrifolium*, in which the symptoms are very mild, contained only striate bodies (4·37 per cent.), while *S. variabile*, a completely masked carrier of the virus, showed no inclusions of either kind. These observations point to a direct correlation between the presence of cell inclusions and the severity of the mosaic symptoms.

Matthews (E. D.), Reneger (C. A.), & Thomas (R. P.). **Soil studies on the causes of the brown rot of Tobacco.**—*J. agric. Res.*, lviii, 9, pp. 673–684, 2 graphs, 1939.

In their investigations of the chemical and biological soil factors suspected of association with brown root rot of tobacco [*R.A.M.*, xviii, p. 64], the authors found that by plating out many of the infected tobacco roots and soils from Maryland they obtained, among others, pure cultures of *Rhizoctonia bataticola* [*Macrophomina phaseoli*], which were almost exclusively of the *Sclerotium* form of the organism, and for this reason are referred to as *S. bataticola* [ibid., xvii, p. 115]. Cultural studies showed that the fungus is readily killed by air-drying, decomposes cellulose, readily utilizes nitrate or organic forms of nitrogen, and grows better in neutral to alkaline media; these characteristics are apparently in accordance with the field conditions tending to favour the occurrence and severity of the root rot. It is further stated that the disease was reproduced by inoculation with *S. bataticola* in the greenhouse under controlled conditions. The authors conclude that previous explanations of the cause of brown root rot are fallacious and that *S. bataticola* can be responsible for the disease though it may not be the only fungus capable of causing it.

Levykh (P. M.). Влияние температуры, влажности и реакции почвы на развитие черной корневой гнили Табака. [Effect of soil temperature, moisture, and reaction on the development of Tobacco black root rot.]—Всесоюзн. научноисслед. Инст. Табачн. Махорочн. Пром. им. А. И. Микояна (ВИТИМ) [*The A. I. Mikoyan pan-Soviet sci. Res. Inst. Tob. and Indian Tob. Ind.* (*VITIM*)], *Krasnodar, Publ.* 137, pp. 3–12, 1939. [English summary.]

In continuation of his studies on black root rot of tobacco (*Thielaviopsis basicola*) [*R.A.M.*, xvii, p. 774] the author states that the results of greenhouse experiments [some details of which are given] showed that the incidence and intensity of the disease are not markedly affected by variations in constant soil moisture ranging from 30 to 80 per cent. of saturation, the main contributing factors in the development of the rot being soil reaction and temperature. The latter point was well supported by field experiments at Krasnodar, where under ordinary condi-

tions the disease usually fails to establish itself even in infected tobacco transplants, while on plots in which the soil temperature was reduced to 22·7° and 25·7° C. by mulching, up to 47 per cent. of the seedlings developed the disease. In pot experiments the optimum P_H value was between 6·4 and 7, the development of the rot being very poor at P_H 5·5 and 8·2. Laboratory tests indicated that the chlamydospores of *T. basicola* did not germinate at temperatures from 2·4° to 5° and from 39° to 40°, the optimum for germination lying between 28° and 30°; the optimum P_H value was 5·87, no germination ensuing at 3 and 12·89.

Grooshevoy (S. E.). Протравление корней рассады перед посадкой, как мера борьбы с болезнями Табака. [Disinfection of the roots of Tobacco transplants before replanting in the control of Tobacco diseases.]—Всесоюзн. научноисслед. Инст. Табачн. Махорочн. Пром. им. А. И. Микояна (ВИТИМ) [*The A. I. Mikoyan pan-Soviet sci. Res. Inst. Tob. and Indian Tob. Ind.* (*VITIM*)], *Krasnodar, Publ.* 137, pp. 31–39, 1939. [English summary.]

Details are given of experiments in 1937 in North Caucasus, the results of which showed that dipping of the roots of tobacco seedlings just before replanting in 1 per cent. Bordeaux mixture or in a mixture of 2 per cent. iron sulphate and milk of lime (in the proportion of 1 part iron sulphate to 1·2 parts unslaked lime) very considerably reduced the infection of the seedlings with mosaic, bacterial 'ryaboukha' [chiefly *Bacterium tabacum*: *R.A.M.*, xvii, p. 712], and black root rot [*Thielaviopsis basicola*: see preceding and next abstracts]. The treatment did not injuriously affect either the rooting or the subsequent growth of the tobacco plants, and in one series of experiments it increased the yield by from 6·3 to 26·7 per cent. While admittedly preliminary, these results are considered to warrant further trials on a wider scale.

Grooshevoy (S. E.). Использование солничной энергии для обеззараживания парниковой земли под стеклянными рамами. [Disinfection of seed-bed soil in cold frames by solar energy.]—Всесоюзн. научноисслед. Инст. Табачн. Махорочн. Пром. им. А. И. Микояна (ВИТИМ) [*The A. I. Mikoyan pan-Soviet sci. Res. Inst. Tob. and Indian Tob. Ind.* (*VITIM*)], *Krasnodar, Publ.* 137, pp. 51–56, 1939. [English summary.]

The author states that effective control of tobacco seedling diseases, including black root rot (*Thielaviopsis basicola*) [see preceding abstracts], was obtained in 1938 in the Caucasus, in experiments in which the seed-bed soil under cold frames had been subjected, prior to sowing, to direct sunlight for periods sufficient to raise the temperature of the top layer of the soil (to a depth of 10 cm.) to between 40° and 60° C. Subsidiary tests are further stated to have shown that *T. basicola* chlamydospores, the most heat-resistant of the tobacco seedling parasites, are completely killed by one six-hour exposure to 60° or two consecutive six-hour exposures to 50° to 55°; two similar exposures to 45° reduced the germinability of the chlamydospores from 15·7 to 0·7 per cent. Potted tobacco seedlings planted in soil taken from the top 5 cm. in the treated

cold frames developed 1 per cent., and those planted in soil taken from a depth of 5 to 10 cm. 4 per cent. black root rot, as against 65 per cent. in control seedlings. The duration of the treatment is dependent on the temperature to which the top layer is raised under the frames, and ranges from one day at 60° to seven days at 40°.

ORTH (H.). **Untersuchungen über die Biologie und Bekämpfung des Erregers der Stengelfäule der Tomate [Didymella lycopersici (Kleb.)].** [Studies on the biology and control of the agent of Tomato stem rot (*Didymella lycopersici* Kleb.).]—*Zbl. Bakt.*, Abt. 2, c, 9–13, pp. 211–244, 5 figs., 7 graphs, 1939.

A comprehensive, tabulated account is given of the writer's studies on tomato stem rot (*Didymella lycopersici*) at the Aschersleben branch of the Reich Biological Institute [*R.A.M.*, xviii, p. 508]. The perithecia and ascospores of the fungus were neither found on overwintered plant residues in the open, nor did they develop in culture on synthetic media maintained for lengthy periods at under 0° C., so that the pycnidial stage (*Ascochyta lycopersici*) [ibid., xvii, p. 506] is evidently the chief agent in the spread of infection. The disease occurs in two well-marked forms in the field, viz., primary infection of the stem bases through the soil, and secondary outbreaks, due to spore flights, on the leading shoot, petioles, and especially the leaf axils. The fruits are also commonly attacked by the fungus even in the lighter types of soil where the vegetative organs remain free from infection. The seed coat is permeated by the mycelium and covered with pycnidia, so that soil infestation and the consequent perpetuation of disease through the seed are possible. Old plants are normally more susceptible than young ones, the symptoms of stem rot seldom developing before transplanting to the open; however, when young plants have their cuticle and epidermis removed they are as liable to infection as more mature ones. Infected seed rarely gives rise to diseased plants, but an occasional reduction of germination has been observed.

On various agar media the optimum temperatures for mycelial development and pycnidial formation were 17° to 19° and 16° to 20° C.; at 31·8° growth was entirely inhibited. The thermal death point of the pycnospores was found to lie between 44° and 48° (continuous exposure for five minutes). Agar cultures of *D. lycopersici* buried in sand, in which, as observed above, stem rot seldom occurs, were destroyed by the natural heat of the soil, but prolonged subjection to cold (—20°) did not impair the viability of the fungus.

D. lycopersici grows on a number of agar media, while dilute decoctions of organic manure and samples from the infested black soil region also constitute suitable substrata. The fungus penetrates the soil to a depth of 5 cm. It is well adapted to a saprophytic mode of existence and its parasitism on tomato is purely facultative. Dense mycelial growth is produced by the organism in liquid media, especially with the addition of tomato extract. Twice-distilled water gave more consistent germination results than once-distilled or tap water, the two latter being improved in this respect, however, by the addition of tomato extract, which appears to exert a specifically stimulatory effect. The juice of *Solanum racemiflorum*, a semi-resistant wild form, gave a moderate

stimulus to spore germination, not to be compared with that resulting from the action of the cultivated varieties (Lucullus in these tests).

Notwithstanding the extreme sensitivity of the spores to fungicides, the chemical control of stem rot presents considerable difficulties, success in the open being achieved only by watering with 0·1 per cent. mercuric chloride and the application of 1 per cent. formaldehyde to the supports. In the greenhouse the death of infected plants was retarded by the stimulation of adventive root formation by the heaping-up of sterilized soil round the plants, while the treatment of the stem bases with 3 per cent. ceresan or uspulun loam emulsion gave good control in inoculation experiments. Another means of reducing the incidence of infection consists in the sparing use of stable manure.

None of the 108 cultivated varieties tested in the greenhouse and field gave evidence of immunity from *D. lycopersici*, and even the resistance of *S. racemigerum* [*Lycopersicum pimpinellifolium*] and *S. racemiflorum* under glass was not uniformly maintained during four years' growth in the open [ibid., xii, p. 477]. *S. nigrum* is seldom attacked by the stem rot fungus, the development of which on the shoots in inoculation tests was not followed by any sign of injury. Solanaceous weeds are thus probably of little importance in the dissemination of the disease, which is effected mainly by the movement of infested soil particles.

Hynes (H. J.). **Control of Tomato leaf mildew. Successful results in glasshouse tests.**—*Agric. Gaz. N.S.W.*, l, 5, pp. 244–247, 3 figs., 1939.

Highly encouraging results in the control of leaf mould (*Cladosporium fulvum*) [*R.A.M.*, xviii, pp. 352, 353] on Chinese Red tomatoes in glasshouses were obtained in experiments conducted in two localities in New South Wales in which the plants were given ten or twelve fortnightly applications of shirlan AG spray at the rate of 1 to 1½ lb. per 40 gals. of water, alternating with sulphur dusting. The total amounts of shirlan used were 3¼ lb. per house of 680 plants and 10½ lb. per house of 650. Untreated plants and those treated with six other preparations were heavily infected. Good, but somewhat less satisfactory results were obtained in a third locality following seven fortnightly applications of shirlan AG at the rate of 1½ lb. per 40 gals. of water.

Taken as a whole, the treatment extended the picking period by three to four weeks and considerably increased the yield, in most cases by 50 to 60 per cent. The net profits from the treatment (neglecting the cost of labour) approximated to £20 to £25 per standard house.

Pickel (D. B.). **A 'podridão estilar' do Tomate.** [The 'style rot' of Tomato.]—*Biologico*, v, 4, pp. 68–70, 1 fig., 1939.

Inoculation experiments with *Fusarium solani* and other fungi associated with style rot [blossom end rot] of tomatoes [*R.A.M.*, iii, p. 488; xvii, p. 297] having given negative results, the writer attributes the disorder, which has recently been observed in Brazil, to functional disequilibrium consequent on a sudden onset of dry weather during the period of fruit formation. A similar effect may be produced by drying winds. Control measures should include the selection of resistant varieties, the use of argillo-silicious or clay-humus soils, drainage to

counteract excessive humidity, replacement of stable manure or other nitrogenous products by phosphates, erection of wind-breaks, e.g., of *Crotalaria juncea*, and timely irrigation during dry spells.

WOLF (F. A.). **Leafspot of Ash and Phyllosticta viridis.**—*Mycologia*, xxxi, 3, pp. 258–266, 4 figs., 1939.

In a study on a leaf spot disease of ash in the Duke Forest, North Carolina, *Phyllosticta viridis* was identified as the causal fungus. The disease is known to occur on *Fraxinus americana* and on *F. pennsylvanica* and its variety *lanceolata*, and is presumably widely distributed east of the Rocky Mountains. It attacks trees of all ages, the black fructifications being found either in patches or uniformly distributed over the entire lower leaf surface. With the advancing season pale green spots, gradually increasing in size, develop, the necrotic area measuring 0·5 to 1·5 cm. across by the middle of September. Large trees may be defoliated four to six weeks before the killing frosts occur. The perithecial stage of the fungus, maturing by the middle of March, was identified as *Mycosphaerella fraxinicola*. An examination of stained sections of infected leaves showed that the fructifications of the fungus are borne in stromata, each containing one to three spermogonial and carpogonial locules. Spermatial formation is initiated near the centre of the locule and proceeds centrifugally, each cell liberating four spermatia from the apex of a sterigma. Perithecial development is initiated at the same time as that of the spermogonia. In each locule there are one to four septate carpogonia. Mature perithecia are spherical, with a short, ostiolar papilla, and vary in diameter from 75 to 100 μ; mature asci measure 40 to 50 by 10 to 12 μ and contain eight ascospores, which are hyaline, uniseptate (the basal cell being the smaller), usually biseriate, and measure 8 to 10 by 4 to 4·5 μ. *M. fraxinicola* germinated readily in cultures from ascospores or tissue, forming small greyish- to brownish-black colonies. The fungus was found capable of discharging its ascospores over an extended period (15th March to 1st July), infection being probably conveyed to the foliage by currents of air. The mycelium develops slowly and pathogenesis becomes evident only about the middle of August. No conidial stage has been found. The two stages of the fungus are genetically connected for the first time in this paper and an amended description is given.

WILKINS (W. H.). **Studies in the genus Ustulina with special reference to parasitism. IV. Conidia—germination and infection.**—*Trans. Brit. mycol. Soc.*, xxiii, 1, pp. 65–85, 1 fig., 6 graphs, 1939.

The measurement of 250 conidia of *Ustulina vulgaris* [*R.A.M.*, xviii, pp. 69, 356], collected from beech trees over a period of six months in each of three consecutive years, showed their average size to be 7·31$\pm$0·003 by 3·06$\pm$0·0001 μ. The age of the conidia did not significantly affect their germinative capacity. They germinated at temperatures ranging from 5° to about 30° C., with an optimum between 20° and 25°, and a lower thermal death point below 0°. Germination occurs most readily in liquids, but also to some extent in a saturated atmosphere. Observations indicated that in nature moisture is a vital factor in the

production of conidial fructifications, and that a well-distributed rainfall of at least 0·5 in. per week is essential. The conidia germinated best in starch medium and oatmeal, and Leonian's was the best synthetic medium for their germination. The P_H range for germination was approximately between 2 and 9, with an optimum between 5 and 6. Germination tests in extracts from green and seasoned wood of seven different species showed that the conidia germinated better in the former, though good results were generally obtained in all the extracts with the exception of seasoned oak. Penetration of the germ-tubes occurred in six of the woods tested, but not in oak. Inoculation experiments with conidia on young beech and lime trees (12 of each) were successful, but the examination of infected trees after five years showed that no decay developed. The results of the investigations are considered to indicate that the conidia of *U. vulgaris* are the most probable agents of tree infection in temperate climates.

SERVAZZI (O.). **Contributi alla patologia dei Pioppi. VI. Ricerche sulla così detta 'defogliazione primaverile dei Pioppi'.** [Contributions to the pathology of Poplars. VI. Researches on the so-called 'spring defoliation of Poplars'.]—*Boll. Lab. sper. R. Oss. Fitopat. Torino*, xv, 3–4, pp. 49–152, 18 pp., 11 graphs, 1938 (issued 1939). [French, German, and English summaries.]

In this exhaustive account of researches carried out in Italy from 1933 to 1938 inclusive into so-called spring defoliation [*R.A.M.*, xvii, p. 779] of the type of poplar known locally as Canadian poplar (though its exact identity is very doubtful), the author states that the diseased material almost constantly showed the presence of a species of *Pollaccia*, which he names *P. elegans* [with a Latin diagnosis] and to which he attributes the disease, though inoculation tests with the fungus gave only negative results. The fungus causes large triangular black spots on the leaves. *Venturia populina* [ibid., xv, p. 618] also occurred on diseased shoots, and was proved by cultural studies to be the perfect stage of *P. elegans*. Sphaeropsid G. 2191 [ibid., xvii, p. 779], reported by other workers as associated with spring defoliation, is only saprophytic, or at most a weak parasite.

Under the conditions prevailing in Piedmont, the disease appears when the minimum temperature approximates to 10° C. and becomes more intense when the daily temperature lies between 10° and 25°; rainfall and atmospheric humidity are only secondary factors.

P. elegans also occurs on the pyramidal poplar (*Populus nigra* var. *italica*) and to a limited extent on other species of the section *Aigeiros* Duby of the genus *Populus*, e.g., *P. nigra* and the so-called Carolina poplar; on this last it produced a condition closely resembling 'spring defoliation'.

The differential characters of *P. elegans* and *P. radiosa* [*V. tremulae*: loc. cit.] are tabulated. The former has mostly biseptate conidia which measure over 30 by 10 (average 35 to 37 by 10 to 11) μ. In culture the maximum, minimum, and optimum temperatures for germination are, respectively, about 25°, below 10°, and about 15°, the corresponding growth temperatures being about 25°, below 10°, and between 15° and 20°. The colonies are felt-like, olive- or grey-green, compact, and

stromatic. 'Conidioid' hyphae, conidia, perithecia (*V. populina*) and pseudosclerotia are produced. The fungus does not grow in liquid media, or in media containing only saligenetic glucosides as a source of carbon. The perithecia have no or few appendages, and the ascospores average 20 by 10 μ.

Elm disease.—*Quart. J. For.*, xxxiii, 2, pp. 112–113, 1939.

According to a report received by the Forestry Commission, elm disease [*Ceratostomella ulmi*: *R.A.M.*, xviii, p. 558] appears to have received a check in England, where fewer trees, especially in eastern districts and the Midlands, show active signs of infection. It is thought, however, that this situation is only temporary, inasmuch as a similar check occurred in 1932, after which progress was resumed. The Jersey elm (*Ulmus stricta wheatleyi*) is stated to be more resistant than other varieties commonly grown in England. The disease does not appear to be present in Scotland, though *C. ulmi* was found there in a dead log in the present year.

Ruszkowski (J.). **Poland : organization of the Plant Protection Service.** —*Int. Bull. Pl. Prot.*, xiii, 5, pp. 108–109, 1939.

A brief outline is given of the organization of the Plant Protection Service in Poland, where 13 stations, attached to the Chambers of Agriculture and maintained and controlled by the Ministry of Agriculture and Agrarian Reform, work in close collaboration with agricultural and horticultural experiment stations, seed-testing stations, and schools of agriculture.

St. Lucia. Statutory Rules and Orders, 1939. No. 13. 29th April, 1939.— 2 pp., 1939.

This proclamation by the Governor prohibits, except under licence, the importation into St. Lucia of banana plants and parts thereof, as a precaution against the introduction of *Cercospora* [*musae*: *R.A.M.*, xviii, p. 560].

Proclamation No. 4 of 1939.—*Nyasald Govt Not.* 18, 1 p., 1939. [Mimeographed.]

Proclamation No. 4 of 1939 (made under the Nyasaland Plant Pests and Diseases Ordinance [cf. 1924, *R.A.M.*, iv, p. 255]) prohibits the importation or introduction into Nyasaland of all citrus trees, plants, budwood, seeds, and dried peel, including candied peel, grown or produced in the territory administered by the Companhia de Mozambique, as well as fresh citrus fruits grown in the Beira, Neves Ferreira, Busi, and Cheringoma Districts of the same territory. The introduction into Nyasaland of fresh citrus fruits grown in other districts of the said territory is permitted provided their place of origin is certified.

As regards the territory administered by the Companhia de Mozambique, this proclamation repeals Proclamation No. 11 of 1936 [*R.A.M.*, xvi, p. 80], in so far as the latter relates to fresh citrus and dried citrus peel.